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THE

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ISSUED BY DIRECTION OF

THE HON. THE SECRETARY FOR AGRICULTURE.

EDITED BY A. J. BOYD F.R.G.S.Q.

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DEPARTMENT OF AGRICULTURE.

SECRETARY FOR AGRICULTURE - - Hon. J. V. CHATAWAY.

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Agricultural Adviser—P. McLean.

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Instructor in Fruit Culture—A. H. Benson.

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Viticulturist—E. H. Rainford.

Assistant Instructor in Fruit Culture—S. C. Voller.

Instructor in Coffee Culture—H. Newport.

Editor "Agricultural Journal"—A. J. Boyd.

Artist and Photographer—F. C. Wills.

Agricultural College.

Principal—J. Mahon.

Mathematical Master—P. M. Pitt. Natural Science Master—P. Sutherland.

Assistant Chemist—F. L. Nott. Farm Foreman—A. Watt.

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Dairy Instructor—C. McGrath. Horticulturist—C. F. Cole.

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Inspector of State Farms—W. Soutter.

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Botanical Gardens, Brisbane.

Curator—P. Mac Mahon.

Inspectors under "Diseases in Plants Act."

Under Secretary for Agriculture (*ex officio*).

A. H. Benson	H. Tryon	E. H. Rainford	D. Jones
J. Henderson	C. Ross	H. A. Tardent	S. C. Voller
H. Newport	J. Liverseed	W. French	T. Doherty, Police
R. Guthrie	J. Aitcheson	W. H. Knowles	J. Pink

G. Williams.

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The Influence of Agricultural Conferences on Farm Life.

By THE EDITOR.

One of the great advantages which the farmer has over all other workers is the healthfulness of his occupation. His work may be, and undoubtedly is, hard; but if he would pause to think of his surroundings, of his conditions of life, and of the wide and promising field which it opens to him for scientific research—if he would recognise that his is a vast and elevated arena in which he may exercise his mental as well as his bodily powers—if he would see that his art or profession is one in which distinction and honour are to be attained, even more worthily than by the more mentally laborious learned, and other professions—then would he realise that his life and profession are things in which he may justly rejoice.

He stands before the world as a public benefactor, in the generality of cases, however, without being conscious of the fact. Farming is the only business in the world in which the man who can beat his neighbours in his results, produce better crops, and surround himself with greater comforts, becomes a public benefactor. This is clearly enough to be proved. The tradesman who gets up in the world, does so at the expense of his customers and of his brother traders. He makes money, if successful, by what are called smart business strokes, but successful dealing does not constitute him a public benefactor, rather the reverse, and his methods are of no importance or value to anyone but himself. No one is the richer for his exertions but himself, but many are poorer.

The farmer, on the other hand, cannot, even if he wished to do so, hide the secrets of his success. All his work is open to the world to criticise and emulate or to improve on. Has he succeeded in producing the two proverbial blades of grass, he does not keep his methods to himself, but he calls his friends and neighbours together to rejoice with him over his success, and to show them how they may go and do likewise. The way in which he sets about the tilling of his land, the treatment of his stock, the seasons at which he sows, plants, and reaps, the manner in which he stores and markets his produce, are all open secrets, which he gladly imparts to his neighbours. Not content with his immediate friends, he does what he can to spread his superior knowledge throughout the country, and in no better manner does he do this than by attending agricultural meetings and conferences, where he either speaks or reads papers on subjects with which he is better acquainted than others.

We are led to these remarks by considering the work done at the late Conference at Warwick, where some 150 of the most intelligent and highly trained planters, farmers, orchardists, and dairymen have given Australia the benefit of their ripe experience and of the experience of those who sent them to the Conference to represent them. These hundred and odd delegates were

exponents of the views of probably a hundred thousand people engaged in rural occupations. Their papers and speeches, and the animated discussions thereon, will be read by many hundreds of thousands of agriculturists, fruit-growers, planters, and others, not only throughout Australasia, but almost over the civilised world; for the *Queensland Agricultural Journal*, in which the proceedings of the Warwick Conference are published, finds its way from Queensland to the outside four-fifths of the world. We merely mention this to show that the farmers, so far from hiding their light under a bushel, as tradespeople do with the secrets of trade, blazon forth their successes equally with their failures, and thus, as we have said, become public benefactors. Their success in life has this to still further sweeten it: It has not been the result of grinding the life out of others, it has caused no single heartache to unfortunate debtors, but has been hardly earned and honestly gained, and everyone round these captains in the ranks of practical farmers is, or ought to be, the richer for the example they furnish, while no one is made poorer by their success.

The Annual Conferences, which are held alternately at the various centres of the agricultural industry, cannot but exercise a most beneficent influence upon the various branches of agricultural science. During the course of the year, new discoveries, new inventions, new plants, and new methods come thick and fast: and what time so well chosen to propagate all new ideas as the week of the Agricultural Conference, where men are gathered together from the four corners of Queensland, intent upon giving and receiving those new ideas?

Our forefathers, even in this fertile land, have reaped the fruits of the virgin soil with scanty appliances and little experience in farming. The rich soil bountifully responded to the most barbarous methods of cultivation. But they have left us, as an inheritance, the duty of restoring the land to its original fertility. How are we to do it? It must be accomplished by thorough cultivation, subsoiling, draining, irrigation, and the liberal use of farmyard manure and artificial fertilisers. The modern farmer must, and usually does, discard all antiquated machinery and implements—he casts to the winds many time-honoured fallacious theories. He makes horse, wind, water, and steam do the work our forbears did with their hands. This gives him time to improve his mind by studying modern agricultural literature. It is no longer necessary for him to work sixteen hours a day to "get there." If we reflect on the extent to which we old farmers taxed our young muscles at the expense of our brains, the wonder is that we are as intelligent as we are. But for this we have to thank agricultural shows and conferences. There we have tardily learned the lessons by which our sons are now profiting. It cannot be gainsaid that the dull, plodding, hard-labour farmer, who has no time to read, who begins his laborious day tired and ends it worn out with fatigue, cannot nowadays become a successful farmer. He must blend exercise of the muscles with exercise of the mind. There are no problems in the exact sciences, no questions of law, no intricacies of engineering, so difficult as the problems presented by nature to the farmer. He has to grapple with exhausted soils, insect pests, the vicissitudes of the seasons, with storms, floods, and droughts, with diseases of various animals, with low prices, short crops. In fact, the whole powers of Nature are alternately arrayed against him, and he must overcome these or go under. Here, then, he has scope for exercising all the faculties of his mind and body, and he has to call to his aid the botanist, the entomologist, the geologist, the chemist, and a host of others expert in some one particular branch of science on which the operations of the farmer depend. By their aid and the exercise of his mental powers, he is enabled successfully to combat and check injurious agencies, to retain and increase the fertility of his land, and to employ such machinery in his work as will leave him ample leisure to read and study the principles of what may be called the noblest and most useful of all professions—agriculture.

Agriculture.

EDUCATION IN RURAL SCHOOLS.

Whilst we have nothing but praise for the excellent system of State school education throughout the colony, whilst we respect and appreciate at their full value the State school teachers, and the splendid work they have done and are continuing to do in the cities and townships throughout this great territory of Queensland, we believe we are justified in saying that there is still one channel through which the stream of instruction has not yet flowed—a channel which, if once filled and set flowing, will carry the beneficent stream throughout the land, eventually bringing wealth, health, and rural comfort to thousands of homes. This so long neglected channel is Agricultural Education. Let us at once say that we do not advocate a systematic course of instruction in the science of agriculture in the State schools. In the nature of things such a course would be impossible—first, because the time spent at the schools by children in the rural districts is of short average duration, hence allowing an all too brief period for mastering the three R's and a certain amount of geography, history, &c; secondly, because the teachers were never expected to add agricultural subjects to the ordinary school curriculum, and hence went through no course of preparation, nor were they required to pass any examination in agriculture We may further point out that whatever pleasure the teachers may personally derive from the cultivation of a piece of land in their spare and holiday times, or from the rearing of poultry and cattle, yet teachers are not farmers. The long course of arduous study and training gone through by them during their pupil-teachership, and whilst passing through the various grades to the higher classes, necessarily left them no time to study agriculture in a practical manner. Instruction of a comprehensive nature in this branch of education can therefore only be given in an Agricultural College, or in Dairy Schools, where all the instructors are specialists in their own particular branch of the various industries coming under the head of "agriculture."

But, these premises being conceded, we hold that is quite within the range of possibility to render the instruction imparted in the schools under notice more consonant with the environment of the pupils than is now the case. It can be shown that without altering the curriculum in any way, without adding one single fresh burden to the teachers or pupils, that curriculum can be so handled as to attain the desired end in a manner not only not burdensome, but rather enjoyable to teachers and taught.

What is one of the most important duties of the teacher? Is it not to train the faculties of observation and research in the child? And how can this be better accomplished than by encouraging the spirit of inquiry—the curiosity, we may call it, so natural to every child?

More particularly should children be encouraged to observe the phenomena of Nature, and the results of her operations in the ordinary events of daily occurrence everywhere about them. They should be invited to collect specimens of natural history, and to ask questions about all they see. Wherever possible, they should be encouraged to take a share in beautifying the school premises; they should be allowed to cultivate small plots of ground. Whilst doing this, they would soon discover that certain causes produce certain effects. They would find that their flowers, fruits, or vegetables will not thrive except under certain conditions—such as a supply of necessary plant food, manure, water, heat, or cold. Insect pests would also claim their attention, and in a simple way the intelligent teacher would explain how all this comes about, and how the

enemies of plant life are kept in check. Then he could cause them to observe the habits of insects—point out how they act as fertilisers of certain blossoms. The harmless and dangerous insects and animals would come in for innumerable subjects for object lessons. There is no need for any text books to be placed in the children's hands; no set lessons should be learned by heart. All should be spontaneous on both sides. The teacher himself would no doubt refresh his memory, or gain some useful information from books: but no book should be employed in conversation on any of these little subjects with the pupils.

One valuable means towards inculcating a love of Nature in the youthful mind is the taking of occasional walks into the country. Everyone knows how children, both boys and girls, will scatter about, following the banks of a stream, or wandering through the scrubs or fields picking up all kinds of insects, flowers, stones, and fruit. All these they should be encouraged to learn something about, not in a dry-as-dust fashion, but in a pleasant, intimate, conversational manner. There is another way of arousing their interest—that is, by stimulating the dormant faculty of imitation latent in most children, but very apparent in some. They should be provided with pencil and paper, or a slate and pencil, and induced to try and copy such specimens as they might find, but the most ludicrous efforts in this direction should be taken by the teacher as seriously as if they were works of art. Nothing so much damps a child's enthusiasm as a sneer. This is the most effective means of crushing the open, child nature. Every little first attempt should be commended, and the pupil helped to improve.

There are all sorts of other ways in which a painstaking teacher can inculcate a love of rural life in the children entrusted to his or her care, but we have said enough for the present. We may state that the above remarks are dictated by actual experience. They are not theory, for we put them into practice for several years, and always with the most encouraging results. Yet the ordinary work of a school was never for a moment disturbed. We therefore maintain that what has been done successfully once can be done and should be done again.

REPORT ON WORK CARRIED OUT AT THE QUEENSLAND AGRICULTURAL COLLEGE.

MAY, 1900.

As a result of the splendid rainfall (4·24 inches being the record for ten days) throughout the month, the crops are in a healthy and flourishing condition. The yield of lucerne, as was anticipated last month, is highly satisfactory, 1 ton per acre being gathered from 20 acres. The rain has, however, delayed the sowing of the stud wheats.

During the early part of the month, 11 acres of Algerian and Tartarian oats were sown for grain, in sections, at the rate of $\frac{3}{4}$-bushel and $1\frac{1}{2}$ bushels per acre, respectively.

Six acres of root crops were planted, including carrots, Swedes, and mangolds. Fourteen acres of maize were harvested, viz.:—The celebrated Mastodon and Red Hogan varieties, the yield being 23 bushels per acre. This is regarded as only a half-crop in a favourable season, but the quantity is above what was anticipated. The above was threshed with the "Hardwick Corn Husker and Thresher" (medium size), turning out six sacks per hour.

The general potato crop is now ripening off, and, judging from the number of tubers, we expect a good return. The experimental crop will be dealt with in the next issue of the *Journal*, when definite results can be given.

Near the root crops, an area of $\frac{3}{4}$-acre has been planted with cabbages (Sure-head); also $\frac{1}{4}$-acre with *Paspalum dilatatum*. In the case of the latter, the stools are at first separated with a spade or sharp hoe, each stool is then detached with care and planted out at short intervals (6 inches to 9 inches).

From $1\frac{1}{2}$ acres were harvested $16\frac{1}{4}$ tons of broom corn; this was made into ensilage. The seeds are available for feeding fowls and pigs, and the tops are turned to account in the broom-making industry. The amber cane, also cut for ensilage, brings the quantity of conserved fodder in the new silo to 30 tons 5 cwt.; it will probably be left for three months before it is required for the stock. The new ensilage-cutter, working at the rate of 8 tons per hour, would only require a forenoon to put through the above quantity.

During the month, ploughing has been carried on regularly in preparation for new crops and further experiments. Portions of this newly ploughed land have already been treated with fertilisers.

In the mechanical department, good progress has been made. A machine. which worked satisfactorily, has been constructed for threshing broom millet The chutes and races at the piggery were also completed, and the calfpens finished. Implements and buildings have been kept in repair, and the portable machinery set up and fixed where required. The foundations of a large open hayshed are being prepared on the banks of the Lockyer Creek. Its dimensions, according to specifications, are: 90 feet long, 75 feet broad, 23 feet high; the middle bay is 45 feet wide, clear; the posts are ironbark; dressed timber only will be used in connection with the roof and curtain; the roof will be covered with 6 tons of galvanised iron; it is estimated to have a capacity of nearly 500 tons. The shed over the boiler at the pumping station has been completed, and foundations laid for additions to the men's quarters. The Horticulturist's residence was painted. A fence has been erected around the apiary to protect the beehives from interference by cattle. The liquid manure tank has been fitted up with a 3-inch outlet pipe and screw valve, whilst a lead pipe was put down at the weighbridge. Water has been laid on and troughs fixed at the sheep paddock. Forty marking posts, each 6 feet in length, were made to permanently fix the boundaries of the acre plots in the experimental portion of the farm. Foundations for the new cheese-room were laid near the dairy; this room will possess the advantage of convenience, and give separate storage for cheese and butter.

Permission was granted to the firm of Waugh and Josephson, of Surrey street, Sydney, to set up a new oil engine, 1 horse-power. The explosion is produced by an electric spark, benzine being the oil employed. This engine does thoroughly good work, driving a cornmill, a pumpkin-slicer, small chaff-cutter, or circular saw.,

A shed for carrying out experiments with different manures has been erected. The back of this is lattice-work, the ends chamfer boards, the roof iron; it is protected in front by hessian blinds fixed on rollers. Steel tram lines will convey three trucks, carrying a number of earthenware pots out of the shed when desirable; the tram rails are bent up at the ends to prevent the trucks running off. In the earthenware pots it is intended to carry out instructive manurial experiments, under shelter, with different plants and recorded quantities of soils, manures, and seeds. Observations will be recorded, and photographs obtained from important results. It is anticipated that these experiments will be of interest to both students and visitors to the College.

The dairy herd has been submitted to a rigorous examination, and it was found that a few half-bred cattle re-acted to the tuberculin test; these will be destroyed.

The pure-bred Ayrshires and Jerseys now in milk are rugged every night, and, in consequence, yield a larger quantity of milk; this was proved to our satisfaction last winter. The total quantity of milk treated during the month was 2,243 gallons; 1,718 gallons of this yielded 1,915 lb. cheese, and 525 gallons gave 214 lb. of butter. The increase for the month was as follows:—Pure-bred Jerseys, 1; Ayrshires, 1; crossbred, 1.

Pigs.—Increase: Pure-bred Berkshires, 12 (4 boars and 8 gilts). Pure-bred Tamworths, 7 (1 boar and 6 gilts). General stock, 11.

Twelve pigs were killed for bacon, average weight 130 lb. One pure-bred boar and one sow (Berkshire) were forwarded through the Department of

Agriculture to the Rockhampton show, to be sold after exhibition. One pure-bred Berkshire boar has been sold and forwarded to Gin Gin. The Tamworth boar, procured from Hawkesbury Agricultural College, has developed into a strong, good-constitutioned pig, and is being utilised to cross with the Berkshires to test the bacon-producing qualities of this grade pig. There are now available for sale twenty pure-bred Berkshire boars, and some thirty pure-bred sows, all offspring of selected pigs imported from Victoria and New South Wales. There are also for sale five pure-bred Middle Yorkshire boars and four sows, all from first-class stock; also, one pure Tamworth boar.

In the garden, considerable progress has been made by the crops referred to in the last issue of the *Journal*. Cabbages then planted out are now ready for cutting—six weeks from the seed. These were treated four times with liquid manure. Varieties—Burpees All-head, Sure-heart, and Succession, all have hearted up in a wonderful way. Seven thousand cabbage plants were set out during the month. Land is being prepared to plant out cauliflowers. New varieties of strawberries are being tried; results will be given later. The Dwarf Champion tomato is noticeable for quality, quantity, and size of fruit. Red and white stone turnips are doing well. In the grounds, near the main buildings, camphor laurel and other avenue trees have been planted to the number of 100, and gravel paths have been laid down between the buildings

On 12th May, the Principal, staff, and students paid a visit to the Hermitage Experimental Farm, near Warwick, and had the opportunity of inspecting the very interesting collection of implements and crops to be seen there. The senior students expressed their satisfaction at what they had seen, thanking Mr. Mahon for his management of the trip, and Mr. and Mrs. Ross for their courtesy and kindness.

The close of the third College year was celebrated on 30th May by a dance and social given by the students, the gymnasium being utilised as a ballroom. Several visitors from Brisbane, including the Minister for Agriculture and Mrs. Chataway, were present; the Lockyer district was also well represented, the total number of guests being upwards of 100 A most enjoyable evening was spent.

As regards the examinations, held during the latter part of the month, the results have been most satisfactory, showing hard work and earnestness of purpose on the part of the majority of the students.

LEAKS ON THE FARM.

No business of any kind can be carried on without some losses. The most wealthy of merchant princes—the shrewdest of financiers—have all suffered annual losses. There is always a leak somewhere. The farmer therefore need not be surprised that leaks exist on the farm. But there are some leaks which can be easily stopped if proper attention be paid to them. One of these leaks is in the manure heap. So little do most of our farmers think of the daily loss from the stable floor that they do not trouble their heads about it, yet they consider themselves, and are considered by others, economical men. Where horses are stabled, and dairy cattle are housed or even only brought in twice a day at the milking hour, there is a constant unnoticed loss going on. The economical man has never realised the scientific fact that 1 ton of urine from the horse-stables is worth 3 tons of the solid manure. So with the byre, the drainings from the cowshed are worth twice as much as the droppings. A simple way of stopping this leak is to cement the floor, and lead all moisture to an underground tank.

Another source of leakage is in the destruction, by burning, of large quantities of vegetable refuse, which ought to go to make up a rich compost heap. The farmer is doubtless the gainer of a certain amount of potash in the ashes, but, as the ashes are rarely spread, they benefit just the spot on which the refuse was burnt. In this connection we may point out the waste of good fertilising material in old bones, &c.

Then, again, there is a serious leak in the corn and potato field. The seed is sown, the potatoes planted, and in due time the plants appear. Here and there there is a blank space in the row. "Only a miss or two," says the economical man. But just reckon up the loss by "only a miss or two" in every row on 5 or 10 acres of potatoes or on 50 acres of corn. Each unreplaced miss will represent from 1 lb. to 2 lb. of potatoes, large and small. Each unreplaced miss in the cornfield represents at least three cobs, possibly six, where, as is often the case, two cobs grow on one plant.

There is loss in bags with unmended holes, loss in implements constantly left in the field without shelter, loss in the unthatched stack. In fact, if a farmer will take the trouble to look for leaks he will find plenty of holes to block up.

There is another way, also, in which the farmer suffers loss. That is, in buying what he can raise for himself. He buys meat, flour, vegetables, fruit, cakes, sweets, &c. He sends valuable crops to market to be sold by a middleman to retailers whose customers pay the last price, of which the producer, who did all the work, gets the smallest share. He is paying another man the profit he should have himself by producing many necessaries and luxuries of life on his own farm, and by attending to the sale of his own crops without the intervention of a third party.

SMALL SILOS.

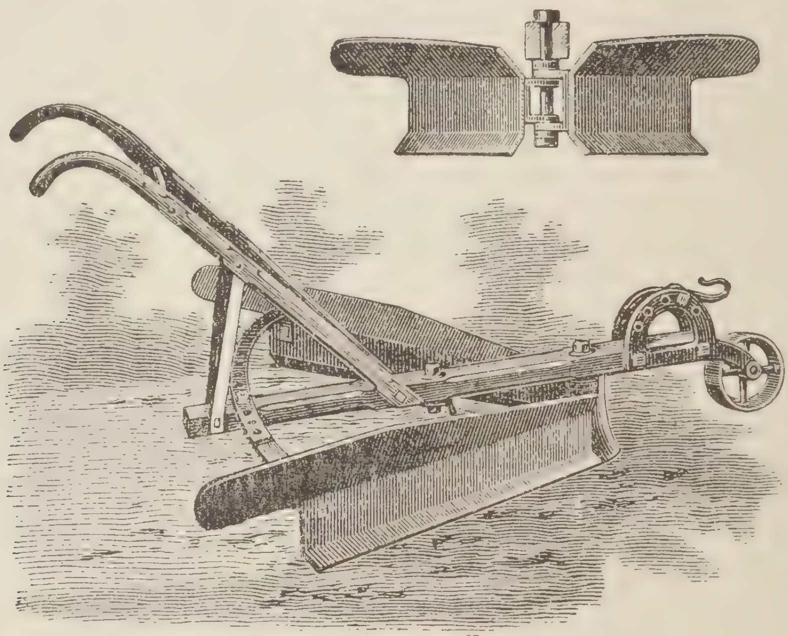
Professor F. H. King, of the University of Wisconsin, has sent to the *Rural New Yorker* a sample of corn ensilage made in a galvanised iron cylinder only 18 inches in diameter and 42 inches deep, and illustrates in a very forceful way how certainly good silage can be made if only the silo lining is airtight and the filling is done in the proper manner. This silage was made from flint corn planted very thickly so that few ears would develop, and it contained 32·6 per cent. of dry matter when put in. The corn was put into the can in small lots at a time, and was tramped continuously by a man who kept changing his position while the filling was going on, and so thoroughly was it packed that 163·65 lb. went in, giving a weight of 27·7 lb. per cubic foot. The surface was simply covered with two layers of acid and waterproof paper, upon which was laid a board, not fitting the circumference tightly, to hold the paper closely to the surface of the silage, but it was not weighted. In this way the cans stood during 178 days in the very warm, sunny, and dry plant-house at the Wisconsin Experiment Station, where the changes in weight were recorded every ten days during the interval. The amount of spoiled and injured silage on the top had a depth of 9 inches; all of the remainder was as good as that which was sent to you. In another cylinder, only 1 foot in diameter, but 10 feet deep, equally good corn silage was made and kept the same length of time under similar conditions. The amount put into the cylinder weighed 247·25 lb., and the amount removed was 240·95 lb., thus sustaining a loss of $2\frac{1}{2}$ per cent. of the green weight.

Professor King made similar trials with green oats just coming into milk, cut for hay to prevent clover being smothered, and with this difficult crop, during sixty days, the three short, broad cylinders which were filled sustained a mean loss of less than 5 per cent. of the green weight, and the tall one of only 1·4 per cent. The loss of dry matter in these small silos in these cases was 4·69 to 10·93 per cent. of that put in for the period of sixty days, while the loss of dry matter in the interior of the corn silage, referred to above, during the 178 days, was 11·4 per cent. These experiments demonstrate—first, that good silage can be made in very small and shallow silos, provided the walls are airtight, and the silage is very thoroughly tramped while it is being put in; second, that when silo linings are airtight the necessary losses are small; third, that thorough tramping of the silage at the time of filling, to expel at once as much of the entangled air as possible, is very important, and will amply repay for the necessary labour, even where the silos are deep.

A NEW FORM OF CORN AND POTATO HILLER.

Our illustration pictures a new implement for hilling corn and potatoes, in which the mould-boards can be adjusted relatively to the advance share so as to insure the banking of the soil close to the rows of plants at each side of the furrow. The hiller has been patented by Van Allen Whitbeck, of Aquetuck, N.Y.

To the underside of the beam a bracket is secured, at the forward end of which a share is carried, extending up into engagement with the beam. A pivot-pin passes through the beam, the bottom portion of the bracket behind the share, and the overlapping projections of the mould-boards. These mould-boards are straight, and in all positions are within the line of the side edges of



the share, so that the earth turned up by the share passes freely to the outer faces of the mould-boards. The mould-boards are provided with extensions on their rear ends, from which extensions apertured segmental arms project laterally. These arms are designed to slide one over the other, and are held in adjusted position by means of a bolt passing through registering apertures. By this means the hiller can be adjusted to any desired width. The peculiar formation of the mould-boards insures the earth's being carried up close to the roots of the plants and deposited on the upper portions of the rows. The lower part of each mould-board serves to cut weeds; the upper part throws rising earth downward; and the straight body sections conduct the earth directly to the plant stems.

The inventor informs us that by mounting the hiller on a runner and raising the colter-wheel a very efficient snowplough is formed which runs with remarkable steadiness.—*Scientific American.*

LIME FOR PEANUTS.

It is not necessary that the soil on which peanuts are to be grown should be naturally calcareous; but if it is not it must be limed, the lime being necessary both for the proper fruiting of the plant and for its mechanical effect upon the soil. Much of the Virginia and North Carolina land has in times past been heavily marled; and there are parts of Tennessee and other States where there is already sufficient lime in the soil for the peanut plant.

Besides this addition of lime on soils where it is not naturally found, peanuts need a dressing of potash and phosphoric acid. The potash is best supplied in the form of kainit, the phosphoric acid by fine ground phosphatic slag. If the soil is heavy, instead of the slag a dressing of superphosphate may be used.

The lime and other dressing would be more effective if ploughed under early in the season; but they may be spread down the furrow in which the seed is planted or applied as a top-dressing after planting. Any kind of lime may be used, provided it is finely comminuted by burning before application. Thoroughly burnt oyster-shells, which are very accessible to farmers living along the Eastern Seaboard, common limestone, or marl will answer the purpose of the planter.

The quantity of lime or marl to use at one application depends very much on the nature of the soil and the amount of vegetable matter it contains. Generally 30 bushels of lime, or from 100 to 150 bushels of marl, are safe applications; but if the soil is quite thin and contains but little vegetable mould, more than this at one time would be attended with risk. A safer plan is to make several small annual applications of lime, and also of vegetable matter (manure, compost, Wood's earth, &c.), continuing this until a sufficient amount of lime has been applied. Land will bear large quantities of marl with perfect safety if kept well stocked with some vegetable matter to subdue its caustic effects. But most of the best peanut soil is deficient in humus, and the planter should begin cautiously, using small quantities of lime until he has supplied the other deficiency.—*U.S. Department of Agriculture.*

THE EFFECT OF THE SIZE OF SEED ON THE POTATO CROP.

The effect of the size of potato "seed" is one on which various opinions exist. The *Michigan Farmer* says:—"When cut, some maintain that one eye is all that is wanted, and the crop is as good with this as with more. Some consider that it is a waste to plant the sets whole, while others think the best results are got with uncut seed. With the object of throwing some light on this matter, experiments have been conducted at the Guelph Experimental Farm. Having lasted for four years, these may be taken as pretty reliable, and they emphatically show the advantage of planting good sets.

"The first set of experiments, which extended over four years, was to test the effect of the number of the eyes in the sets. Though nine of the different sets were failures, still the difference in the yield between those with one eye and those with five was very considerable, amounting to about 28 bushels, the results being as follow:—

From 1 eye, 136·41 bushels per acre
From 2 eyes, 144·70 bushels per acre
From 3 eyes, 153·13 bushels per acre
From 4 eyes, 162·82 bushels per acre
From 5 eyes, 164·37 bushels per acre

Up to four eyes in each set the increase in the yield is, roughly, 9 bushels for each additional eye, so that up to that extent the increase in eyes would be well repaid in the yield."

IRRIGATION IN QUEENSLAND.

The advisability and necessity of irrigation to successful cultivation (says the *Brisbane Courier*) have long since been endorsed in this and other parts of the world which would otherwise be quite unable to feed a redundant population. It is, therefore, to be regretted that its adoption in Queensland shows diminution rather than increase. The report of the Registrar-General on the irrigation of this colony during the year 1899 discloses a striking decrease in the number of acres irrigated as compared with the area operated on in the preceding year. In 1898 there were 9,648 acres irrigated (50 per cent. increase on the area previously irrigated), and last year only 6,311 acres. This demonstrates the area irrigated to be below that of any year since 1894. Various causes are assigned for this falling off in different districts. Around Blackall the cost of supplying water is reported to have been too dear, and could not therefore be used. At Isisford, still further west, the operation proved a

failure on account of the drought, a circumstance not readily understood by residents on the coast, but quite intelligible to those who have travelled the West country. At Gatton the irrigator reports non-success owing to the hardness of the water, and at Roma the water from the bore is said to have been unsuitable for vegetables, but only fair crops of maize have been gathered. From Charleville comes the report of very indifferent results in wheat, while other crops are stated to be fairly good. St. George intimates only average crops. The most noteworthy decreases are 2,577 acres in the Ayr district, and 634 around Rockhampton. At Ayr, which is the only district irrigating sugar-cane on a large scale, the report states that the sugar crop of that district was only a little over one-half of that of 1898, partly attributable to frost and partly to want of water. Some of the farmers there marked their returns as "No water, no crop," clearly showing that in that district, whilst dry weather reduces the crop, without water supplied by irrigation there is no crop at all. Esk, which in 1898 returned 225 acres irrigated, returned none for last year, the plant not having been used; and similarly Toowoomba, with 125 acres two years ago, made no return last year. The increases are noted in the Mackay, Cunnamulla, Cook, and Bowen districts—all small areas, however. There are still 210 irrigators at work, and considering there are 356 artesian bores in the colony, each yielding upwards of 750,000 gallons of water per diem, besides others of smaller flow, it would seem that such water could be utilised for irrigation purposes to a much larger extent than it has been. The Registrar makes cogent comment on the non-utilisation of the rivers of fresh water running through the rich lands of the seaboard, where sugar is cultivated, and points out that in Java, where a yield of about 4 tons of sugar to the acre is obtained, land is only placed under sugar in localities which can be irrigated. The whole question of irrigation is deserving of much more attention than it has received.

SCARLET RUNNERS.

In sowing these beautiful beans, care must be taken that the soil is in good fine tilth, and that the soil with which they are covered is also in a fine state. They should not be set deep in the ground, but be just covered sufficiently to protect them from possible bird enemies. The distance apart at which to set them has been much disputed, but the proper distance between the rows would appear to be about 3 feet, and from 15 inches to 2 feet between the plants. If they are planted closer than this, the plants are likely, in rich soil, to run together. Most gardeners provide sticks for them to run on. This is all very well with a small patch; but when they are sown in larger areas, the proper course is to discard sticks altogether, and top the plants, thus keeping them down and the crop within easy reach. For seed purposes, a few may be run on sticks. If the seed is good, the bean will run to from 12 to 14 inches in length, and a length of 16 inches has lately been attained in England. The best season for sowing scarlet runners is from September to April. The dwarf varieties of French beans may be sown at the end of July and in August. Allowance has to be made for late frosts in either case.

EXTRACTS FROM THE MONTHLY REPORT OF THE BIGGENDEN EXPERIMENT FARM FOR MAY, 1900.

It is gratifying to be able to report at last a breakup in the drought. During May over 3 inches of rain have fallen in six days. Such a welcome change has, of course, put the ground in good heart and given a nice start to our winter crops, such as lucerne, cereals, &c. The temperature having also been mild for the time of the year, a nice spring in the grass has taken place,

ensuring a good supply of feed for our horses, which continue to be in very fair health and condition. In the cultivation paddock the work has consisted chiefly in keeping clean the growing crops, in cutting and baling chaff from the wheaten and the cow pea stacks, also in transplanting experimental grasses, such as *Paspalum di'atatum*, and those winter vegetables which were in need of it.

CO-OPERATION.

At the session of the late Agricultural Conference held at Warwick last month, Mr. C. P. Mau read a very thoughtful and instructive paper on "Co-operation, and How to Make Use of It." The full text of the paper is published in our special Conference number, and will well repay careful perusal. We have written so often and so much on this subject, that we should only be repeating ourselves by enlarging on it again. It has been clearly demonstrated that the farmers, dairymen, and graziers—in fact, all who derive a living from the land—are benefited by co-operation. When produce has to pass through many hands before reaching the final purchaser, it is quite plain that a considerable portion of the profit must go to the agents intermediate between the producer and the consumer, and the former is invariably the greatest sufferer. Yet it is within his power to retain the whole of the profit if he will but do it or be taught how to do it.

In South Australia the Farmers' Co-operative Union has set an example of co-operation well worth following, as it has proved highly successful.

We call to mind one instance in which the Union bought 100 tons of fertilisers in one line and 700 tons in another, and so enabled the farmers to get it at nearly 10s. per ton less than they would have had to pay if they had purchased it themselves.

Still, the bulk of South Australian farmers are not alive to the advantages of combination, as witness the subjoined *résumé* of a paper read by Mr. Dunn at a meeting of the Elbow Branch of the Agricultural Bureau :—

"This subject has often been discussed by the Bureau and the Press, but very little progress has been made. Everyone agrees that co-operation is good; but until producers and consumers are brought into closer contact, no improvement can take place. Farmers have sold their wheat this year at 9s. per bag (4 bushels), and had to buy some of it back, in the shape of flour, pollard, and bran, at double that price. Outside the good that the Farmers' Union is doing, not much advantage can be gained by shipping wheat to England, as the profits are not so large as has been imagined, and there is a good deal of difficulty in the way. The union might help members by erecting a mill, and supplying flour at a lower profit than is exacted by millers. By purchasing in bulk, a co-operation could supply its members with implements, fertilisers, tools, fencing wire, and numerous other requisites at a lower price than is at present paid. If it were made possible to borrow money at a low rate—under control of a local body—for construction of water reservoirs on private property, it would save many thousands of pounds per annum on labour in carting water, and in lost time."

Mr. Wake followed with a paper on the same subject, read at latest Congress. To follow out the ideas in these papers, capital was wanted, and he suggested the establishment of a fund by regular subscriptions, and as money accumulates, use it for co-operative purposes. He thought it could be worked in conjunction with the Bureau. The General Secretary, however, said it could not be so worked, but the whole of the members of the Bureau might co-operate with others, and do excellent work outside the limits of the Bureau. Mr. Du Bois said co-operation could be begun without capital. This was wanted most in selling produce and buying requirements, and a co-operative bank was not needed for that. By combining to purchase large quantities of manure, for instance, farmers in every district could save much money annually: so

with bags and all other requisites. The Farmers' Union was a good co-operation, and the more it was made use of, the less would be the proportionate cost of its working.

In writing on "Co-operative Food-buying," an English journal says:—If there be a producer who is taken advantage of by dealers who co-operate to trade with him, it is the farmer. Rings, market cliques, auction marts, and wholesale dealers, and even the Government and the War Office, give him little option in fixing the prices when trade has to be done. There is not a line in which farmers have (except in a few co-operative societies, where other produce has been the chief factor) done so little for themselves as in that of bought corn and meal. When one *does* buy on a decent-sized farm, the quantity is usually considerable, and one may get a bit knocked off on that account; but the bulk is scarcely enough to let one go over the heads of two (and sometimes three) factors who come between us and the Mark Lane or Liverpool shipper, and so get our supply direct. This fact is most to be regretted when one is buying in stuff for pigs. In buying meal, for example, take a look at the current week's quotations: there is the Mark Lane quotation of fine middlings at 105s. to 110s.; coarse ditto at 98s. to 105s.; pollard, 84s. to 88s.; maize meal, 96s. to 106s., all at per 2,240 lb., or, per ton. These are, we conclude, excepting the maizemeal, home-grown stuff. Now, go to a local dealer and get and compare his prices. If you cannot see where there is a saving of a penny or three half-pence in the shilling—that is, if you have a neighbour or two who is similarly situated—it will be a pity. The fact is, the dealer buys in bulk sufficient to give him a low rail quotation for carriage. He seldom holds bulk: it would not pay him to do so, and he gets a quotation beforehand. The merchant may be loth to quote farmers the same, but if they try several and then give one or two an option, they will be pretty sure to do a good deal. I don't know that I hold quite entirely with big co-operations for buying. There are working expenses and margins for interest, &c., even in those.

VARIETIES OF OATS COMPARED.

In a lecture which he recently delivered under the auspices of the Stewartry County Council, Professor R. Patrick Wright, of the West of Scotland Agricultural College, gave an instructive account of some interesting experiments which he had conducted during the past season with the object of testing the relative merits of the leading varieties of oats grown in that part of the country.

A dozen varieties were tested, and of these that which gave the best all round result, so far as yield of straw was concerned, was Tam Finlay, which in one case, gave a yield of 2 tons 13 cwt. per acre; in another case 2 tons 1 cwt., and in a third 1 ton 19 cwt. Other varieties which showed up to advantage in this respect, were the old potato oat, the Newmarket oat, and the Hamilton oat.

Of all the varieties, Tam Finlay proved the best tillerer, next in order in this respect being the sandy oats, then a variety known as improved Ligows, and fourth on the list, the Hamilton oat. Of the different varieties tested, that which proved the earliest everywhere was Tartar King, while Tam Finlay was everywhere the latest to ripen. On one farm the periods of ripening were for the Tartar King, 132 days, for the potato oat, 137 days, and for Tam Finlay, 146 days, while on another, the Tartar King took 140 days to ripen, the potato, 145, and Tam Finlay, 148.

Of all the varieties tested, that which gave the highest average yield of grain was Messrs. Garton's new oat, the Pioneer, which produced 2,287 lb. of dressed grain, and 237 lb. of light grain per acre. Long Houghton came next with 2,069 lb. of dressed grain and 237 lb. of light grain, while the potato oat gave 1,988 lb. of dressed and 232 lb. of light grain. All these varieties, however, fall considerably short of the Tam Finlay in their yields of straw, the Pioneer giving only 29½ cwt., the Long Houghton, 31 cwt., and the potato, 32½ cwt., as against 40 cwt. and over, obtained in the case of the Tam Finlay.

Dairying.

PIGS AND THEIR MANAGEMENT.—No. 8.

In the annual report of the Superintendent of Farmers' Institutes of Ontario, we find the following recommendation to those bacon-curers engaged in the export trade to Great Britain with respect to

THE TYPE OF PIG REQUIRED.

The type of pig which the bacon-curers engaged in the export trade to Great Britain find the most profitable in their business is one of great length and depth, light in the shoulder and jowl (which are cheap cuts), not too wide in the back, and carrying its width evenly along from shoulder to tail. This ensures a deep, long ham instead of the thick short one which used to be so general. The back and belly should run in as straight lines as possible. This, with the depth of side, enables the curer to produce the famous Wiltshire bacon or sides, so called from the particular way it is cut, which form of bacon is so esteemed in Great Britain at the present time. When a feeder gets a pig of this type he will find, provided he feeds it suitable food, that he will get a "fleshy hog" as opposed to a "fat" one. Fat hogs are not desired, and all that exceed 1½ inches in thickness of fat on the back will net a lower price than such as are within that standard. The most desirable weights for bacon hogs are from 160 to 190 lb., or thereabouts, which weights can be reached when the pig is six to eight months old. And here is a point where the interests of the feeder and bacon-curer are quite identical, for pigs up to those weights give a larger increase of weight for the amount of food consumed than those fed to reach heavier weights.

POTATOES.

Cooked potatoes can be profitably used with grain for the production of bacon without fear of injuring the quality of the meat. This is proved by both American and Danish experiments. From 4 lb. to 4½ lb. potatoes are equal to 1 lb. of grain for pig-feeding.

BONEMEAL AND WOOD ASHES.

In experiments conducted by Prof. Henry as to the advantage of feeding bonemeal and wood ashes to fattening pigs in combination with corn meal, it was found that the effect of bonemeal and wood was to save about 28 per cent. of the total amount fed to produce 100 lb. of gain of live weight. Bonemeal doubled the strength of the thigh bones, while ashes were only slightly inferior in this respect. The results showed the great usefulness of bone and meal ashes, especially where much corn is fed to hogs. In these experiments the pigs had been well started in their development when the trial began. They were divided into three lots of two each. Lot 1 received corn meal with salt and water; lot 2 received in addition hardwood ashes; while lot 3 was fed a spoonful of bonemeal at each feed in place of ashes. In one of the trials, which lasted 112 days, two pigs consumed 10·5 lb. of bonemeal and 7·5 lb. of salt, and during the same time two other pigs consumed 33 lb. of hardwood ashes and 8 lb. of salt. The earth in the yards in which the pigs exercised was covered with boards to prevent the animals rooting in it and eating it, as they would have done, especially those who had no bonemeal or ashes to resort to, and, consequently, would have impaired the results of this experiment.

When bonemeal was fed, 487 lb. of corn produced 100 lb. of gain; when ashes were given, 491 lb. of corn were required, while 629 lb. had to be fed to obtain the same gain when neither bonemeal nor ashes were given.

SOME ENGLISH IDEAS.

COOKED POTATOES FOR PIGS.

ECONOMICAL USE OF BAD POTATOES.

The question as to what kind of soil best suits the pig is one which would receive answers of a most diverse character, although each of them might be strictly accurate from the standpoint upon which the supporting arguments are based. That pig-breeding as a branch of the agricultural business has received more attention from the class of tenant farmers occupying the smaller holdings than from those whose farms are of large size and of repute for fertility is an undoubted fact throughout the west of England. It is carried on in many cases with success on holdings which consist of enclosed common land, or which are in close proximity thereto, the soil being black and stony, and only capable of producing small crops of oats, potatoes, turnips, &c. The pigs bred are usually sold to "jobbers," who take them to market, a sufficient number being reserved to eat up such potatoes as are unfit for sale.

Some years ago, when the potato disease produced sad havoc with that crop, a method of minimising the loss entailed came under my notice. A farmer had taken an inn in the neighbourhood of Bridgewater, which had some land attached to it. Six acres of this land had been planted with potatoes. The tenant, knowing he was about to give up the business, had not been too lavish in the use of manure; as a natural consequence the crop was of most inferior quality, the greater portion being quite unsaleable and much affected with disease. It was a bad job; there was the prospect of a serious loss to be faced. How to lessen such loss was the problem to be solved. The premises were somewhat extensive, having stables, loose boxes, &c.; there was also a large copper used for brewing. As soon as the crop was raised, all the sound potatoes fit for market were separated from the others. The small and unsound were thoroughly washed, the badly diseased picked out, and the remainder fully cooked. After being carefully drained they were allowed to dry for a day or so, then sprinkled freely with salt and pressed into a solid mass. A lot of young pigs were purchased and the cooked potatoes were used mixed with good barley-meal. Much success resulted from this experiment, for such it was undoubtedly. The pigs fattened quickly and produced pork of splendid quality which fetched the highest price in the market. The cooked potatoes were found to keep well, were at no time offensive, and to the end were eaten by the pigs as freely as when perfectly fresh, although some four months elapsed before the final lot was disposed of. A want of suitable plant would, no doubt, prevent this plan being adopted by many farmers who grow large quantities of potatoes. Nevertheless, it is sad waste to give uncooked potatoes to pigs, and in the majority of cases a copper or steaming apparatus would be a most profitable investment.

BREEDING SOWS.

Many farmers make a practice of feeding off their sows after they have borne two or at most three farrows. This is not invariably wise, as a sow that produces young ones which grow rapidly, and is, moreover, a careful mother, should be retained until there are signs of falling off in the quality of the youngsters. Several years will elapse before this takes place. Furthermore it is surprising how frequently the main characteristics of the mother are transmitted to the offspring. It is specially noteworthy that young sows treat their little ones in a manner amost identical with that of their own dam.

PIG-REARING AS PRACTISED IN WEST RIDING.

On grazing farms, such as are to be found in the West Riding of Yorkshire, the farmer gains his livelihood in a multitude of ways. Butter-making, rearing and selling calves (the bull calves are generally sold for veal, while the heifer calves are kept for future use), pig-rearing, and poultry-keeping are the principal branches of the farming industry in a grazing district. I do not at present propose to go into minute details respecting all these various branches of farming, but intend to confine my remarks to pig-rearing.

Pig-rearing is regarded as one of the most profitable businesses in which the farmer can invest his capital. The most successful pig-keepers arrange as nearly as possible to have their sows to pig when milk is most plentiful. They are thus enabled to push the young pigs along more rapidly, and to command a better price for them when offering them for sale. It must be remembered, however, that on a well-arranged farm a scarcity of milk is very rarely heard of. During the first twenty-four hours after farrowing the sow should be given nothing but a weak warm gruel, which should consist of sweet skim milk, with which sharps, bran, and Indian meal have been mixed. The ratio of these meals should be guided by the appetite of the sow, as some sows which have not been used to a rich diet — that is, a diet the greater part of which consists of milk and sharps—will not take rich food when it is offered them, but will greedily eat any common food. The sow's food should be gradually increased as the pigs call for more milk. Any over-feeding at this time is very detrimental, and leads to the inflammation of the sow's udder, and diarrhœa among the pigs. If this trouble appears among the pigs, it will probably go through the whole litter. In that case, it will be necessary to change the sow's food, and to put into it one tablespoonful of sulphur once a day for three days. Not only does this trouble arise from over-feeding, but the pigs will also lose a certain amount of growth which they can never regain. Never give the sow more than she will eat up clean. To feed more than this is waste, and tends to take the edge off an appetite which should be kept continuously keen.

Loss of Young Pigs.

A great number of pigs are lost through the improper care of the sows. The unnatural habit of the sow trying to destroy her young comes largely from improper diet and insanitary surroundings.

Age to Kill Pigs.

As to the best age at which to kill pigs for profit, there are two calculations to take into account. Whilst with the sow little pigs cost very little, and if that little be set against the extra feed we give them when drafted from the sow it will bring their average keep per week to a very small figure. If, on the other hand, we study the fastest growing period of a well-fed pig's life we shall conclude that to take those little porkets and to carry them on to the age of eight months, and to make them attain by that age the weight of 200 lb., means very rapid pork-making that should pay. Of course, the best pay from those pigs will come to where own-grown potatoes, meal, and milk were consumed in the process. As the typical curer's pig averages somewhere about 200 lb., and makes a price of 7s. 6d. per sc., and consumes the stuff one cannot so readily turn into cash by any other means, those pig-men who are in a position to carry their porkets on will be wise to do so.

A typical pig of 200 lb. weight should yield as follows :—Chine, 6 lb.; blade bones, 2 lb. 6 oz.; steaks, 2 lb. 6 oz.; cuttings, 2 lb.; flake fat, 7 lb. 4 oz.; kidneys, 6 oz,; fat from intestines, 2 lb. 6 oz.; feet, 4 lb.; and head, 18 lb.; leaving the two sides, full length, to weigh 155 lb. Growing strains of Middle Whites crossed with Large Whites or with Berkshires would be likely enough to make the weights above given at the age, and the gain from the porket stage would be at the cost of about 4 lb. of meal, with the etceteras for each lb. of weight gained.

"Carfax," who contributes many able articles on pig-breeding to the *Farmer and Stockbreeder*, says :—

LITTLE PIGS AND MILK.

The usage sounds well, but, in practice, feeders of new milk to little pigs scarcely weaned will be apt to overdo them. As small a quantity as half-a-pint of it to each little pig once a day, then, after a few days, twice a day, and later, as much as 1 quart a day, they may possibly assimilate to advantage. Not more than that, I feel sure. The new milk, with all its butter-fat, would be all the

better for a further separation. Just as many persons cannot take a glass of milk alone without feeling the inconvenience of having it all come up into the lungs and form a solid lump ten minutes after—a crude explanation, though correct enough—and so take a dry biscuit to munch whilst sipping the milk; so, neither can a little pig be capable of drinking down at once a pint or two of cow's milk without its feeling the same ill effects. When milk is fed so as to do good, it does good, and more good than any other known form of food. If it be a question of cost, let anyone take the flush of milk period—May and June. The farmers then scarcely know what to do to get rid of their extra supply. Would it not pay them well just then to have a lot of two or three months' old piglets coming to hand? Being essentially fat and flesh-forming, new milk will not require the richer forms of food uniting with it. Of the cheapest, I should prefer middlings, with a little pollard and barley-meal toned down to about half their usual value *pro rata* by an equal bulk—not weight, please—of bran.

THE PIGYARD.

On how many farms where fast pork-making is a feature, is there a pigyard? I mean an open, yet sheltered and partly covered enclosure, where the little pigs may be turned into on the coldest days to get due exercise and not lose too much heat. It seems to be accepted by pig-men that pigs should have exercise. To eat and then to sleep and to only rouse up to eat again is admitted to be bad for pigs in the long run. Just on killing-time, when the pig is laying on the last few potatoes and stones of meal, it may as well have sleeping all his own way, so long as it comes to the trough heartily. But if the owner only knew that nearly all the ills pig's flesh is heir to came by want of suitable exercise, I think he would be the last to keep his little pigs shut up continually. Quite a small enclosure, even it be only a shed with a heap of fresh straw or a barrowload or two of fresh stable litter, may be made to serve in bad weather. On all open days, however, the little pigs should be allowed a run out. As to what constitutes a good pig pasture will depend. Sows may live almost entirely on grass at certain seasons. Little pigs may lose money on it if they make it their chief sustenance. What the little pigs want is a run and a scamper. This will straighten their limbs, and also encourage them to perform the functions that relieve Nature. They will then return to the trough with hearty appetites and with replenished vigour, and every such return will mean many extra mouthfuls of food consumed. One of the best pigyards I have seen was one that filled the space between a double row of sties that faced each other. The court was completed by a high wall across each end, and had lean-to roofs sloping inward, attached to the end walls right across. The place was well guttered and drained, and the court, or yard, was always perfectly dry, except, of course, when it was actually raining. Being floored with cement laid on a slope, it dried directly. Under each covered lean-to there was kept a heap or two of clean litter. Each heap was shaken up fresh daily, and a few beans, or a potato or two, were thrown into it. Sows and little pigs both revelled in these heaps of litter, when they were taken there for exercise. As the sties kept ten or twelve sows going, readers will guess that such a pigyard was made a great and good use of.

SWINE FEVER.

ITS CAUSES AND EFFECTS.

Swine fever, swine plague, or swine pox is a disease of pigs much like typhoid fever is to the human being. Its symptoms are many and varied, and it is bad to describe, but the following is as near as I can give them:—

Outwardly, the pig is dull and loses his appetite, but has a great thirst, and will drink anything he can get. He has a heavy look about his eyes, as though he had a pair of spectacles on, and stands with his back up, and has a most dejected appearance. He gives a short barking cough when disturbed, and will not move unless he be made to. In a day or two he breaks out in a reddish purple rash, which passes down the front part of his body; the ears, and across

the shoulders, down the inside of hind legs and along the belly are of a dark purple. The dung is hard, and has a peculiar nasty, sickly smell. He refuses all solid food, but still drinks a lot, and huddles in one corner, as though afraid of the light or cold. If made to move he does so with difficulty, and may have shivering fits ; diarrhœa sets in, and the end is near. One-ounce doses of sweet spirits of nitre in warm gruel or linseed tea will relieve it during the first day or two. Small doses of castor oil or salts will relieve the bowels, and a table-spoonful of sulphur every day in the gruel will help the afflicted animal for the first few days, but no solid food must be given, only light sloppy food easily digested. Try to keep the bowels open and the body as warm as possible. Injections of soap and water may be used, and scrupulous cleanliness should be observed.

COLOUR IN PIGS.

As the large black breed of pigs is evidently coming to the front, it may be well to consider the *pros* and *cons* of colour. Doubtless this subject has been brought up, and been thrashed out times out of mind. There are, however, always the inexperienced and unconvinced in our midst, and the question will, on their account, bear rehandling. As to the *pros*, the pro-black men can argue that black is, all the world over, the natural colour of the animals, biped and other, that have to stand the tropical heat. They can claim, on that ground, that the black pig will be the healthiest animal for one to possess in the hot periods, and that we shall be saved the anxiety of caring specially for our pigs during heat spells that we should feel were they of a white colour. On the other hand, the white pig-men can turn the table, and say that, as all Arctic region frequenting animals are white in colour and their pigs ditto, the white pig must be preferred in winter because there is so much more chance of its standing the cold. Really, there is nothing in either argument, because one may in any hot weather see white-skinned pigs revelling and glorying in the sun, and caring not a grunt whether the thermometer be 69 degrees or 96 in the ahade. As frequently may we find the blacks looking their very best and doing it, too, in mid-winter. There is then left only the argument as to the colour of the hair—black, red, or white—on the skin of the pork or bacon.

SEPARATED MILK

When one comes to the fact that in separated milk we have at once about the worst form of a milk food for calves, and the best one for young pigs, cost *pro rata* being the consideration, and cost taking in the healthiness and well-doing of the animals, one may almost conclude that a herd of dairy cows kept within carting distance by road of a creamery, co-operative or otherwise, should pay best when one gets rid of the calves at the very earliest, and takes to feeding young pork. It is a saving to the connection all round when the sender-in of new milk by road can take back his churns full of separated milk. If the creamery can make it pay them to use up the separated milk by pigs, surely the farmer can do it, when he can so well give it exactly the most favoured use, that of making it an auxiliary to the home-grown food—meal and roots—the pigs are to pay for consuming. For pigs milk of great richness is an uncalled-for article. Separated milk, as a wholesome and nutritious drink, is called for, and the meal foods supply the rest. Even if one were called upon to add fat to the diet, taking it that butter-fat may be worth perhaps 1s. per lb., there are fats or oils that will meet the case that will not cost one-fourth of the price of the butter-fat.

A calf-rearer may argue that on the old method of using hand-skimmed milk with the customary builder-up of linseed mucilage he did his calf-rearing cheaply and well. He may question the gain by pigs. But if each cow can make £10 per annum by following the creamery business, her calf, even if hand-reared on separated milk, will not make as much money as a sow bringing two litters a year would, and the question of separated milk should be well met.

SPAYING YOUNG SOWS.

Young pigs are generally spayed about the age of ten weeks. The operation consists in the removal of the ovaries, and, in some cases, the womb also is excised—which at that age is but little developed—by a cut made in the left flank, and should be performed by a man who knows what he is about. To perform the operation two persons are required to fix the animal, the one holding the head and forequarters, the other the hindquarters. Having made the incision in the lumbar region, the index finger is introduced into the abdomen in search of the left ovary, which lies under the loins. In the adult sow it is about the size of a walnut, but in the young pig it is smaller. The ovary is seized with the finger and drawn outside the incision, and detached by tearing or twisting it from the ligament to which it adheres. The finger is again introduced, and on reaching the womb finds the left portion, which had been moved in detaching the left ovary, is back in it place. Pressing the finger further in, with care and gentleness, it reaches the other corner of the womb, when the right ovary is found and removed in a similar manner, unless, as sometimes happens, the ovary is found in another situation of the womb, in which case it is previously disengaged. When the operation is over, the wound is sewn up, and the pig kept very quiet and fed sparingly, until the wound is thoroughly healed. Care should be taken that the young pigs have not been fed for at least twelve hours before the operation takes place, and that they are fed very sparingly for some days after.

The *Canadian Farmers' Advocate* says:—There is no doubt that it is advantageous to spay sows for feeding purposes, but to achieve success in this operation requires some skill and strict attention to a number of details. We do not recommend anyone to attempt this operation for the first time on the live animal. After gaining a complete knowledge of the situation of the ovaries in the dead animal, the exact relation that the parts bear to each other, there is very little danger in overcoming all difficulties. The method is as follows: Drive a large nail into the lintel of the doors 8 feet from the ground, or in any situation that will command good light; fasten a cord above each hock, and sling the little pig head downwards; sponge the abdomen quite clean, make an incision down the median line about 2 inches in length, taking care not to wound the bladder, which lies immediately beneath the spot; then pass a catheter into the uterus, bringing the body of that organ into view; trace up both horns of the uterus, and with a pair of curved scissors snip out each ovary—an oval body about the size of a small pea. Carefully replace the bowels, stitch up the outer skin and inner peritoneum closely, but not too tight; apply a piece of adhesive plaster over the whole surface. Keep the pig without food six hours before the operation, and give a small feed an hour after. If the operation is properly performed, the wound heals in three days without further trouble. Although we have described the operation, and by following out the details it can be successfully done, still there are a number of conditions that render it troublesome to anyone not completely acquainted with the anatomical conditions to be met with.

Without having some experience, and seeing the operation actually performed, a man would likely have little success in the spaying of pigs from a merely written description, and more especially without a practical knowledge of the physiology of their generative organs; and it is not unlikely that the operation would be so bungled as to result in the death of the pig operated upon. Spaying is usually done at about the same time as the castration of the male (but it is a much more difficult operation), when about six weeks old. An incision is made in the flank, after the animal has been fasted for some time, and through this incision the finger is introduced and the ovaries extracted.

A Victorian exchange advises that in selecting a boar for stud purposes one of the purest breed obtainable should be procured. He should be an even pig throughout, with plenty of length, hams coming well down to hock, and legs straight and clean. It is desirable at all times to guard against selecting pigs

for stud purposes with heavy bones. Head should be broad, with a short, square-shaped snout. The shoulders should be of the same width as the hips. In a litter of pigs there is often one much weaker than the others. This is often called the runt or teatman. It is frequently spoken of as the last pig farrowed, this occurrence being supposed to cause inferiority. This idea was not borne out by the facts observed at the Wisconsin Experiment Station. The first pig born in one of the lots weighed 3·1 lb., and the last 3·6 lb. In other cases the pig farrowed last weighed less than the one farrowed first. In this matter, however, no regularity was observed, and it is stated that no weakness or other inferiority was observed in the last pig farrowed. What is wanted is a strong, healthy, big-formed pig, with lots of growth; and to get such a one we must have a strong, well-developed, muscular sow in the most robust health, with a system so nourished as to be free from all feverish tendency and natural in all functions, and able to furnish an abundance of good milk for the pig from the moment of birth.

TO CURE BACON "MILD."

The first thing to do will be to get the use of a nice clean cellar, dark and cool as possible; a draughty, open slaughter-house is also necessary. When the pigs are killed they should be cleansed and hung up in a cool draught in sides. The sides should then be trimmed and lowered into the cellar. At once they should be pumped in fourteen or fifteen places by means of an ordinary pickle pump and needle, and a brine made up as follows:—To make 20 gallons of pumping pickle, 55 lb. salt, 5 lb. cane sugar, 5 lb. saltpetre, 5 lb. dry antiseptic; make up to 20 gallons with water, boil and skim till clear. This pickle should be used quite *cold*. When the sides have been pumped, lay them on the cellar floor and cover over lightly with a sprinkling of equal parts of granulated saltpetre and dry antiseptic, then cover all over with salt. Allow the sides to lie until all the salt disappears and becomes pickle. This will occupy, on the average, about ten days. The sides may then be taken up, washed in *cold* water, and either used green or smoked. They may also be dried and used as pale dried bacon. These will be mild-cured sides, according to the modern acceptation of the term.

RESULTS OF BARLEY-FEEDING.

Mr. Angus Mackay, of the Experiment Farm, Indian Head, Scotland, recently made the statement that 2 lb. of barley and 1 lb. of wheat would make 1 lb. of pork; but that, if barley alone were fed, it would take 6 lb. of that cereal to get the same results. How does this agree with the experience of our pig-keepers in Queensland? The experiments at the Agricultural College come fairly near to the latter result. The average daily consumption per pig of boiled barley was 10·3 lb., and the average daily gain per pig was 1·93 lb., or 1 lb. of increase of 5·43 lb. of barley consumed.

CONCLUDING NOTES.

We now close the present series of articles on pigs and their management, for the compilation of which, as stated at the outset, we are indebted to our exchanges all over the world. All farmers should remember that the aim should be to raise good pigs and yet feed as economically as possible. Feeding quantities of grain is not, as we have shown, the way to raise cheap pork. As much food should be given to them as can be raised on the farm at an expenditure of little labour, provided, of course, that the food is suitable, such as peanuts, Jerusalem artichokes, lucerne. But these things still require to be supplemented by a certain amount of grain in some form or other. But, if all grain is fed, the animals will not exert themselves and forage about, and will become unprofitable.

Cleanliness in the pen is the best possible preventive of hog cholera. As with cattle and other stock, weeding out, selection, and breeding from the best strains should be the rule.

A pig weighing 150 lb. has more lean meat on it in proportion to its weight than one weighing double as much. It is therefore, worth more per pound, and has not been so costly to produce as the heavier animal.

IN-BREEDING OF DAIRY CATTLE.

It cannot be too prominently kept before dairymen that the only available way to increase the production from their cows is to grade up from what they possess with a pure-bred dairy bull, a bull from a herd with no doubtful blood in it, and it is a well-known fact that we have such herds in the colony. We have dairy bulls to choose from that have colonial records behind them for fifty years, and British another fifty years behind that, and whose offspring at two-year-olds have been going begging for some years for buyers at £10 to £12 per head, finding only few purchasers. And a two-year-old bull will last a farmer ten years, because the surest way of improvement is to use the same bull on his own progeny for as long as he lives. Ten pounds for a bull is the sum total of capital needed to improve a herd. Out-breeding has been the curse of cattle-breeding for the dairy in this colony all along. Mr. McNab mentions a small dairy of twelve cows bred up from Shorthorn dams with an Ayrshire bull, a really grand lot, which were being put to an Alderney at the time of his visit; and had the owner started with an Alderney he would probably have had as good a lot; but the case shows the manner in which stock gets mongrelled up by out-breeding. The two herds specially noted by Mr. McNab as being desirably graded up are already in a fair way to being obliterated, as far as uniformity of type goes.—*Agricultural Gazette*, Tasmania.

DANISH OPINION OF THE BACTERIOLOGICAL RESEARCH IN THE MILK FLORA OF AUSTRALIA.

In the February number of *Australian Farm and Home*, an article appeared on the above subject. In that article the writers practically said that yeast fungus found by them in imported lactic ferment cultures presented "unmistakeable evidence of impurity," and that they were "convinced of the necessity of abandoning their distribution amongst Victorian factories," adding further that a bacteria selected from buttermilk will produce a pure culture with thoroughly satisfactory results. How such opinions are regarded by dairy bacteriologists in Denmark may be learned by the reply thereto of Mr. Hans Tvedes, who is the head of the world-known Blauenfeldt and Tvede Chemical Manufacturing Company, Copenhagen, Denmark, and recognised as a first authority on dairy bacteriology.

Mr. B. Hansen, of Melbourne, hereupon handed to the journal mentioned the following reply by Mr. Hans Tvedes:—

"To the Dairymen of Australia:—

"We have been informed that a circular has lately been issued to Australian dairies, warning against the use of imported dry lactic acid ferment (by which is probably meant the Danish article), as it is believed to contain yeast.

"If the intention thereof should be to prove that the manufacturers add yeast—for instance, beer yeast—to the lactic acid ferment, the assertion becomes simply incomprehensible, and we have in vain been meditating to find out the meaning. The lactic acid ferment must, for several reasons, contain acid bacteries as well as various sorts of yeast sponges, which is certainly previously found in the milk mixed together with various injurious kinds.

"In factories or dairies where neither pasteurising nor lactic acid ferment is used, it naturally depends on circumstances if useful or injurious bacteria contained in the milk prevail or not to make the produce good or bad.

"The greatest importance of the lactic acid ferment is that it contains only useful bacteria and yeast sponges in pure cultivated condition.

"If the above-mentioned circular, in happy unconsciousness, intends to warn against these, we can only pity the exposure of ignorance it gives itself, as the presence of those yeast sponges, together with the right bacteria, play the most important part in developing the aromatic flavour which all butter must possess if the quality 'fine' can be claimed for it.

"When the Danish butter, in spite of the most eager and reckless competition, has constantly been able to hold its ground as an undisputable No. 1 on the British market, this is essentially due to the knowledge and control our factory managers and butter-makers possess of the scientific system, and to the great extent in which the Danish factories use the lactic acid ferment. We dare even go so far as saying that there is not one single factory or dairy in the whole State of Denmark which does not use the ferment.

"Our invention, to produce lactic acid ferment in form of a dry powder, has made it possible to export this article in durable condition to the utmost parts of the globe, and we have thus brought within the reach of all dairies to produce butter of equal quality to the Danish.

"It may, without further comment, be evident that we would simply be acting against our own interest by adding injurious substances to the ferment, and we can, with impunity, reject all ridiculous and absurd imputations aimed at this.

"Our success in butter-making comprises no secrets, but is based on simple, open facts, which are easily followed when the factory manager and butter-maker are guided in the right direction, and supplied with proper knowledge and appliances. Fine butter of equal uniformity and quality to the Danish can therefore now be produced in Australia as well as in Denmark, but the simple and following questions of to-day should not be mismanaged:—

"1. What is necessary to obtain fine butter which will keep?—Absolute clean, faultless, and pasteurised milk or cream.

"2. Is this milk generally obtained from the farmers?—No; neither in Denmark nor Australia.

"3. What then must be done to obtain an irreproachable butter?—Pasteurise the milk or the cream.

"4. Why, and to what use?—Because the faults in the milk arise through microbes which at any time and everywhere alter its taste and hasten its decomposition. The effect of pasteurising is to kill or make those microbes inoffensive.

"5. May churning of the pasteurised milk or cream then make a fine butter?—No; the fine quality of the butter, and especially the flavour and aroma, can only be produced by a pure, cultivated lactic ferment, which is never found in the pasteurised milk or cream, but which the science of bacteriology has isolated, made pure, cultivated, and good results can, therefore, only be relied upon when a properly prepared and scientific organised starter is used, as the dry lactic acid ferment."

That our competitors—the Danes—have equally as many difficulties as we have in Australia, there is not the slightest doubt, and it would be ridiculous to think that the obstacles here should not be overcome and our standard of quality raised to the level of the Danish. Hand separators are here blamed for the deterioration of the butter; but raise the standard of our creamery butter beyond competition of the hand separator, and better prices from the factories will encourage the farmer to supply his milk direct. To do this, give the factory manager an up-to-date knowledge, and machinery equal to what is used in Denmark to treat the milk and cream, and then we shall shortly feel the advantage of the improved system.

THE DAIRY HERD.

QUEENSLAND AGRICULTURAL COLLEGE.

RETURNS FROM 1ST TO 31ST MAY, 1900.

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.			
Linnet ...	Ayrshire	15 May, 1900	399	3·7	13·63	
Leesome* ...	,, ...	12 Oct. 1899	278	4·0	12·45	
Ream Routhie	,, ...	19 Sept. ,,	132	4·3	6·35	Dry, 15-5-00
Laverock* ...	,, ...	7 Dec. ,,	650	3·5	25·48	
Blink* ...	,, ...	21 Mar., 1900	1,064	3·8	45·28	
Rosebud* ...	,, ...	10 April ,,	958	3·8	40·76	
Lavina* ...	,, ...	6 April ,,	936	3·6	37·73	
Bonny ...	,, ...	17 April ,,	642	3·9	28·04	
Effie* ...	Jersey	16 Dec., 1899	513	4·8	27·57	
Connie ...	,, ...	29 Sept. ,,	201	5·5	12·37	
Content ...	,, ...	11 July ,,	214	5·5	13·18	
Eileen* ...	,, ...	13 Aug. ,,	288	5·2	16·77	
Stumpy ...	,, ...	1 July ,,	102	4·6	5·25	Dry, 18-5-00
Ivy ...	,, ...	2 Oct. ,,	271	4·5	13·65	
Opale ...	,, ...	16 Dec. ,,	511	4·8	27·47	
Beatrice ..	,, ...	19 Oct. ,,	215	4·3	10·35	
Jersey Belle	,, ...	21 May, 1900	170	4·0	7·6	
Bashful ...	,, ...	16 Nov., 1899	151	4·5	7·6	Dry, 20-5-00
Fancy* ...	South Coast ...	21 Mar., 1900	968	3·5	37·94	
Broad ...	Devon	5 Oct., 1899	90	4·9	4·93	Dry, 10-5-00
Brush ...	Shorthorn ...	12 Sept. ,,	121	4·1	5·51	Dry, 14-5-00
Blossom ...	,, ...	14 Sept. ,,	183	3·9	7·98	Dry, 20-5-00
Florrie ...	,, ...	15 Sept. ,,	435	3·9	19·09	
Kit ...	,, ...	16 Sept. ,,	348	3·7	14·42	
Hilda ...	,, ...	25 Mar., 1900	658	3·8	28·0	
Folly ...	,, ...	15 Mar. ,,	632	3·5	24·76	
Louisa ...	,, ...	6 April ,,	693	3·6	27·94	
Polly ...	,, ...	29 Jan. ,,	712	3·8	30·35	
Cherry ...	,, ...	19 Feb. ,,	611	3·8	26·0	
Nestor ...	,, ...	21 April ,,	873	3·5	34·22	
Frizzy ...	,, ...	27 Sept., 1899	361	4·0	16·17	
Kate ...	,, ...	13 Aug. ,,	138	4·2	6·49	Dry, 16-5-00
Violet ...	,, ...	1 Oct. ,,	222	3·9	9·68	Dry, 25-5-00
Peggy ...	Grade Shorthorn	14 Oct. ,,	211	3·6	8·5	
Laurel ...	,, ,, ...	4 Oct. ,,	491	3·9	21·45	
Restless ...	,, ,, ...	4 Oct. ,,	548	3·7	22·7	
Rosella ...	,, ,, ...	9 Oct. ,,	401	3·8	17·05	
Redmond ...	,, ,, ...	6 Oct. ,,	218	4·1	9·99	
Shelly ...	,, ,, ...	13 Oct. ,,	112	3·8	4·76	Dry, 16-5-00
Stranger ...	,, ,, ...	15 Aug. ,,	358	3·9	15·63	
Empress ...	,, ,, ...	23 Aug. ,,	151	4·4	7·94	Dry, 16-5-00
Mundah ...	,, ,, ...	29 Sept. ,,	388	3·6	15·64	
Sally ...	,, ,, ...	23 Sept. ,,	433	4·1	19·88	
Ginger ...	,, ,, ...	17 June ,,	399	4·3	19·21	
Biddy ...	,, ,, ...	18 May ,,	613	4·0	27·46	
Bally ...	,, ,, ...	12 Oct. ,,	133	3·9	5·8	Dry, 16-5-00
Leopard ...	,, ,, ...	17 Oct. ,,	99	3·9	4·32	Dry, 12-5-00
Trial ...	,, ,, ...	26 Oct. ,,	483	4·0	21·6	
Duchess ...	,, ,, ...	27 Oct. ,,	567	3·9	24·76	
Podge ...	,, ,, ...	1 Nov. ,,	483	3·6	19·46	
Russet ...	,, ,, ...	10 Nov. ,,	175	4·2	8·23	Dry, 20-5-00
Rusty ...	,, ,, ...	17 Jan., 1900	689	3·8	29·32	
Alice ...	,, ,, ...	13 Nov., 1899	588	3·9	25·68	
Daisy ...	,, ,, ...	21 Nov. ,,	570	3·8	24·26	
Nell ...	,, ,, ...	1 Dec. ,,	387	3·6	15·64	
Gertie* ...	,, ,, ...	31 Mar., 1900	942	3·6	37·98	
Lady ...	,, ,, ...	31 Mar., ,,	554	3·8	23·57	
Eva ...	,, ,, ...	18 May ,,	264	3·8	11·23	
Damsel ...	Holstein ...	5 Dec., 1899	444	3·3	16·41	
Dairymaid*	,, ...	15 Mar., 1900	1,097	3·0	36·85	

The dairy herd, with the exception of the cows marked thus,* and which are being fed for experimental purposes, were grazed on natural pasturage only.

QUEENSLAND AGRICULTURAL COLLEGE.

EXPERIMENTAL PIG-FEEDING.

By JOHN MAHON, Principal.

The experiment of which particulars are supplied herewith was conducted with a view of ascertaining the feeding value of cane molasses when combined with other foodstuffs.

Eight pigs about four and a-half months old were divided into two lots of four each. The pigs were from common sows by a pure Berkshire boar, and were fed for a period of four weeks.

Pen A were fed on ground barley, and Pen B on ground barley to which had been added molasses in proportion of 1 lb. molasses to 5·7 of ground barley.

Table I. gives the weight of individual pigs at beginning of the experiment, and gain in lb. made during the period.

Table II. gives weekly gain and total gain by each pig, daily gain by each pig, and average daily gain per head.

Table III. gives amount of food consumed by each pen weekly, total food consumed during the period, and average daily consumption per head.

The pigs were fed three times a day, and were supplied with drinking water. It will be noticed, by referring to Table I., that, while the pigs in Pen A made substantial gain during the first few days, those in Pen B showed a much smaller increase in comparison. This may be accounted for by the fact that the molasses was fed to them for the first time at the commencement of the experiment, and was not readily consumed by them at first. It was found, however, as the experiment proceeded, that the food was more readily consumed when mixed with molasses.

On perusal of summary we find that Pen A consumed 5·5 lb. of food for every 1 lb. of increase, and Pen B, fed on barley and molasses, required 5 08 lb. of food to each 1 lb. of increase, or ·42 lb. of food less than Pen A for each lb. of gain.

TABLE I.

Showing Weight of Pigs at Beginning of Experiment and Daily Increase of each Pig, and Total Increase of Each.

Pen A.	Fed on Ground Barley.				Totals.	Pen B.	Fed on Ground Barley and Molasses.				Totals.
	1.	2.	3.	4.			1.	2.	3.	4.	
Weight at beginning of experiment	lb. 98	lb. 93	lb. 92·5	lb. 96	lb. 379·5	Weight at beginning of experiment	lb. 83	lb. 89	lb. 77·5	lb. 88	lb. 337·5
Gain—						Gain—					
30 March	6	6	5·5	3·5	21·0	30 March	1	1	...	1	3
31 "	2	3·5	2	4	11·5	31 "	2	1	1	·5	4·5
1 April	1	·5	1·0	1·5	4	1 April	2	·5	2	4	8·5
2 "	1	2	1·0	...	4	2 "	4	5	4	3	16
3 "	...	2·5	2·5	1·5	6·5	3 "	3	2·5	2	2	9·5
4 "	2·5	·5	3·5	2	8·5	4 "	2	2	3	1	8
5 "	·5	1	1	3	5·5	5 "	2	1·5	1·5	2	7
6 "	4	1	2	3·5	10·5	6 "	4	3	3	4	14
7 "	2	2·5	1	2	7·5	7 "	2	1·5	3·5	1	8
8 "	1	2	2·5	1	6·5	8 "	3	3	1	1	8
9 "	2	2·5	2·5	2	9	9 "	2	1·5	1	3	7·5
10 "	2·5	1	·5	·5	4·5	10 "	1	1·5	1	1·5	5
11 "	2·5	2·5	1	1	7	11 "	...	1	·5	·5	2
12 "	4	2·5	3	2·5	12	12 "	2	3	3	3	11
13 "	1	3	2·5	2·5	9	13 "	2·5	2	2	3	9·5
14 "	1	1	3	2	7	14 "	1	1	1	2	5
15 "	1	1	2	3	7	15 "	1·5	2	2	1	6·5
16 "	1	3	1	·5	5·5	16 "	1	2	1	2	6
17 "	2	1	3	1	7	17 "	2	...	1	2	5
18 "	2	2	1	3	8	18 "	3	2	1	2	8
19 "	1	3	2	1	7	19 "	3	3	2	3	11
20 "	3	2	1	1	7	20 "	3	3	1	3	10
21 "	2	1	...	2	5	21 "	2	2	4	2	10
22 "	1	1	2	2	6	22 "	1	1	1	3	6
23 "	1·5	1	2	1	5·5	23 "	2	2·5	1	1	6·5
24 "	1	·5	1·5	1	4	24 "	3	2	1	3	9
25 "	·5	1	2	1	4·5	25 "	1	2	2	2	7
26 "	1·5	2	1	1	5·5	26 "	2	1	2	3	8
Gain per head ...	50·5	51·5	53	50	206	Gain per head ...	58	53·5	48·5	59·5	219·5

TABLE II.

SHOWING WEIGHT OF EACH PIG AT BEGINNING OF EXPERIMENT, WEEKLY GAIN, AND TOTAL GAIN DURING PERIOD.

PEN A.	Fed on Ground Barley. 1.	2.	3.	4.	Totals.
	lb.	lb.	lb.	lb.	lb.
Weight at beginning of experiment	98	93	92·5	96	379·5
Gain—					
1st week ...	13	16	16·5	15·5	61
2nd week ...	18	14	12·5	12·5	57
3rd week ...	9	14	14·5	13	50·5
4th week ...	10·5	8·5	9·5	9	37·5
Weight at end of experiment	148·5	145·5	145·5	146	585·5
Gain at end of experiment	50·5	52·5	53	50	206
Daily gain by each pig	1·8	1·87	1·9	1·78	...
Average daily gain per head	...	...	...	...	1·93

PEN B.	Fed on Ground Barley and Cane Molasses. 1.	2.	3.	4.	Totals.
	lb.	lb.	lb.	lb.	lb.
Weight at beginning of experiment	83	89	77·5	88	337·5
Gain—					
1st week	16	13·5	13·5	13·5	56·5
2nd week	14	14·5	13	14	55·5
3rd week	14	12	10	15	51
4th week	14	13·5	12	17	56·5
Weight at end of experiment	141	142·5	126	147·5	557
Gain at end of experiment	58	53·5	48·5	59·5	219·5
Daily gain by each pig	2·07	1·9	1·7	2·1	...
Average daily gain per head	...	...	...	...	1·96

TABLE III.

SHOWING AMOUNT OF FOOD CONSUMED WEEKLY BY EACH PEN, TOTAL FOOD CONSUMED DURING PERIOD, AVERAGE DAILY CONSUMPTION PER HEAD.

PEN A.	Barley (ground).
	lb.
1st week	298
2nd week	289
3rd week	273
4th week	273
	1,133
Average daily consumption by each	10·12

PEN B.	Barley.	Molasses.
	lb.	lb.
1st week	238·5	32·5
2nd week	245	40
3rd week	246	45
4th week	220	49
	949·5	166·5
	1,116	
Average daily consumption by each	9·96 lb.	

SUMMARY.

PEN A.

Average Daily Consumption per Head.	Total Food Consumed.	Average Daily Gain per Head.	Number lbs. Food Consumed for 1lb. increase.
10·12	1,133	1·93	5·5

PEN B.

Average Daily Consumption per Head.	Total Food Consumed.	Average Daily Gain per Head.	Number lbs. Food Consumed for 1lb. increase.
9·96	Barley. 949·5 Molasses. 166·5 = 1,116	1·96	5·08

FEEDING FOR MILK.

DAILY YIELD OF COWS FED ON A DAILY RATION OF 20 LB. GREEN CHAFFED MAIZE.

Name of Cow.	1.			2.			3.			4.			5.		
	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.
	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.
Eileen (Jersey) ...	17	5·3	1·0	16	5·5	·985	16	5·2	·94	15	5·5	·92	16	5·6	·99
Effie (Jersey) ...	17	5·1	·97	17	5·2	·99	18	5·0	1·0	17	4·6	·87	17	4·8	·91
Laverock (Ayrshire)	22	3·6	·88	21	3·5	·82	22	3·8	·93	24	3·6	·96	22	3·9	·96
Leesome (Ayrshire)	19	4·0	·85	23·5	3·8	1·0	23	3·9	1·0	22	3·9	96	23	3·8	·97
Curly (Grade) ...	20	3·8	·85	20	3·9	·87	21	3·6	·84	22	3·8	·93	22	3·9	·96
Rusty (Grade) ...	24	3·9	1·04	23	3·9	1·0	23	3·7	·95	26	3·5	1·0	26	3·7	1·0

Name of Cow.	6.			7.			8.			9.			10.		
	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.
	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.
Eileen	16	5·4	·96	16	5·2	·94	17	5·1	·97	16	5·3	·94	17	5·4	1·03
Effie	17	5·0	·95	18	5·0	1·0	16	5·5	·99	17	5·3	1·0	16	5·2	·95
Laverock	24	3·8	1·0	22	3·6	·89	22	3·5	·91	25	3·6	1·0	24	3·8	1·0
Leesome	23	3·6	·93	23	3·7	·95	24	3·5	·95	24	3·6	·95	25	3·6	1·0
Curly	24	3·8	1·01	27	3·3	1·0	25	3·6	1·0	25	3·7	1·0	23	3·8	·97
Rusty	23	3·9	1·0	24	3·5	·95	23	3·9	1·0	24	3·6	·96	27	3·9	1·1

Name of Cow.	11.			12.			13.			14.			15.		
	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.
	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.
Eileen	18	5·5	1·1	16	5·5	·99	18	5·0	1·0	17	5·1	·97	18	5·0	1·0
Effie	17	5·3	1·0	18	5·0	1·0	20	5·4	1·2	18	5·0	1·0	17	5·3	1·0
Laverock	23	3·7	·95	24	3·9	1·0	22	3·8	·93	21	3·9	·9	23	3·9	·99
Leesome	23	3·7	·95	23	4·0	1 03	22	3·9	·96	21	3·9	·9	23	3·6	·94
Curly	25	3·6	1·0	22	3·7	·9	24	3·5	·96	23	3·7	·95	23	3·9	1·0
Rusty	26	3·6	1·05	25	3·9	1·09	24	4·0	1·07	24	3·3	·88	26	3·5	1·0

DAILY YIELD OF COWS FED ON A DAILY RATION OF 20 LB. OF GREEN CHAFFED MAIZE AND 1½ LB. MOLASSES.

Name of Cow.	1.			2.			3.			4.			5.		
	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.
	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.
Eileen	16	5·6	·99	17	5·6	1·06	16	5·3	·95	18	5·5	1·1	18	5·0	1·0
Effie	16	5·3	·95	18	5·8	1·16	18	5·5	1·1	17	5·3	1·0	18	5·4	1·08
Laverock	27	3·8	1·14	26	3·5	1·01	26	3·8	1·1	22	3·8	·93	22	3·8	·93
Leesome	20	4·1	·91	18	3·8	·76	17	4·0	·76	15	4·0	·67	20	3·6	·8
Curly...	22	3·5	·86	23	3·9	·99	23	3·5	·9	22	3·7	·91	24	3·8	1·02
Rusty	26	3·7	1·07	28	3·6	1·12	23	3·6	·92	24	3·8	1·02	22	3·6	·88

Name of Cow.	6.			7.			8.			9.			10.		
	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.
	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.
Eileen	16	5·3	·95	16	5·5	·99	18	5·1	1·01	18	5·0	1·0	16	5	·89
Effie	18	5·5	1·1	16	5·0	·89	18	5·8	1·15	17	5·0	·95	16	5·5	·99
Laverock	24	3·8	1·0	25	3·6	1·0	24	3·5	·95	22	3·6	·89	26	3·6	1·05
Leesome	23	3·6	·94	24	3·3	·88	23	3·7	·95	22	3·5	·91	20	3·8	·85
Curly	23	3·7	·95	22	3·7	·90	24	3·6	·96	20	3·5	·78	24	3·6	·95
Rusty	27	3·6	1·08	24	3·5	·95	26	3·5	1·01	24	3·8	1·02	26	3·6	1·05

FEEDING FOR MILK—*continued.*

Name of Cow.	11.			12.			13.			14.			15.		
	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.
	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.
Eileen	16	5·5	·99	17	5·0	·95	18	5·2	1·04	20	5	1·12	18	5·5	1·1
Effie	18	5·1	1·01	17	5·3	1·0	18	5·0	1·0	17	5·3	1·0	17	5·1	·98
Laverock	24	3·4	·9	25	3·6	1·0	24	3·5	·95	23	3·7	·95	26	3·7	1·0
Leesome	24	3·8	1·02	25	3·7	1·01	26	3·9	1·13	25	3·5	·98	26	3·9	1·12
Curly	25	3·7	1·0	22	3·8	·94	23	3·9	1·0	25	3·6	1·0	23	3·7	·95
Rusty	24	3·6	1·07	23	3·6	·91	24	3·9	1·05	23	4·0	1·03	27	3·6	1·08

TOTAL AMOUNTS OF MILK AND BUTTER OBTAINED DURING EACH PERIOD OF FIFTEEN DAYS.

Name of Cow.	Fed on Chaffed Maize.		Name of Cow.	Fed on Chaffed Green Maize and Molasses.	
	Milk.	Butter.		Milk.	Butter.
	lb.	lb.		lb.	lb.
Eileen	249	14·73	Eileen	258	15·14
Effie	260	14·83	Effie	259	15·36
Laverock	341	14·12	Laverock	366	14·50
Leesome	341·5	14·34	Leesome	328	13·69
Curly	346	14·24	Curly	345	14·11
Rusty	368	15·09	Rusty	371	15·26
	1,905·5	87·35		1,927	88·06

With a view of ascertaining what effect would be produced by the addition of molasses (cane) to a daily ration of chaffed green maize when fed to milk cows, an experiment was conducted with six cows. In the selection of the animals only those which had been a considerable time and had a tendency to diminished yields were taken. A daily record was kept. The cows were allowed to run in a grass paddock, and received the ration night and morning at milking hours.

For the first period of fifteen days a daily ration of 20 lb. of green chaffed maize was given, and during the subsequent period of fifteen days 20 lb. of green chaffed maize and 1½ lb. of molasses were fed daily. It is found, by reference to the table of yields that the increase following the addition of molasses to the food was small, being 21·5 lb. of milk or ·71 lb. of butter. It must, however, be borne in mind that the animals were approaching the drying-off period, and no doubt would have given a decreasing yield from day to day had not they received additional foods.

WHAT BUTTER AND CHEESE REMOVE FROM A FARM.

A ton of cheese removes from the farm, in the form of nitrogen, phosphoric acid, and potash, about £3 14s. 7½d. in value. A ton of butter takes only 2s. 4d. worth of those fertilisers; a ton of whey, 3s. 11d.; a ton of buttermilk, 7s. 1d.; a ton of skim milk, 9s. 8½d.; a ton of cream, 7s. 3d.; and a ton of milk, 9s. 3d. It will, therefore, impoverish the farm much less to make butter than to manufacture cheese. A ton of cheese removes 112 lb. nitrogen, worth £3 10s.; 17¾ lb. phosphoric acid, 3s. 11d.; and 2·15 lb. potash, worth 8½d. A ton of butter contains about 2¾ lb. nitrogen, worth 1s. 8d.; 1½ lb. phosphoric acid, worth 4d.; and 1 lb. potash, worth 4d.—total, 2s. 4d. With cheese nearly everything in the milk is removed from the farm; but with butter only a small portion is taken away, and the rest is used on the farm to feed the live stock.—*South Australian Journal of Agriculture.*

The Horse.

HORSE-BREEDING FOR MILITARY REMOUNTS.

By ERNEST A. SMITH.

The letter from Major-General Hutton to the Minister for Agriculture, New South Wales, published in last issue of this *Journal*, deserves more than passing notice. There can be no question that the industry of horse-breeding has never received in this colony the attention it deserves. Our squatters and farmers have for years bred horses almost entirely for their own use, and have sent their surplus stock to the saleyards to be sold for whatever they will fetch. In the large majority of cases little or no attention has been paid to their breeding, the principal qualification in a stallion is its cheapness, whilst as to dams any mare of any description has been deemed suitable to breed from. Under these conditions, it is astonishing that the general run of our horses have not deteriorated more than they have, and this is indubitably owing to the fact that Queensland, except below the Main Range, possesses country unequalled in the world for the breeding of horses. It is obvious, therefore, that if our breeders were to give to their horses half the attention that they give to their bullocks and sheep, there would be no difficulty in producing, in this colony, horses of the right stamp and quality to supply the growing demand for military remounts. An industry could thus be established, the profits of which would be considerable, on account of the special facilities for producing the required type with less cost to the breeder than in almost any other country in the world. The present war in South Africa has emphasised the necessity for a continuous supply of horses, both for cavalry remounts and for artillery and transport; and has also called attention to the necessity for another class of horses—namely, one suitable for mounted infantry. Now the horse suitable for mounted infantry exists in large numbers at present in Queensland, for size here is not desired, as, a mounted infantryman having to mount and dismount rapidly, a wiry, well-bred galloway, ranging from 14·2 to 15 hands is what is required. Of the other classes of horses—viz., the remounts for heavy cavalry, light cavalry, artillery, and transport horse—we may at once discard the first, at the present time, as animals of this description are comparatively rare in Queensland, and it would take some time and careful breeding to breed up to the right stamp in sufficient numbers. But with regard to the light cavalry horse, there should be no difficulty whatever. By using a thoroughbred sire of size and substance, buying such before they have been ruined by the prevalent system of two-year-old racing, and mating them with mares that are sound and free from physical defects, there would be no difficulty in breeding a large number of serviceable animals averaging 15 hands 2 inches in height, that would possess the stamina, speed, and endurance necessary to make the forced marches to which Lord Roberts's success in the present campaign may be greatly attributed. The artillery horse is another type that should be easy to breed. By selecting sound cart or light draught mares, and mating with thoroughbred sires possessing the necessary credentials, an animal exactly suitable for this purpose should be produced, for such a cross would, while possessing the necessary weight, be able to move rapidly and have the necessary *steel* given through the thoroughbred ancestry of the sire. The transport horse could be bred in a very similar manner, except that a heavier class of mare would be required, and a clean-legged mare of the Suffolk Punch stamp would be an almost ideal dam for this purpose.

Now, it may be at once conceded that there is a plentiful supply of mares suitable for each purpose in Queensland, and the only necessity is careful culling so as to breed only from those mares who are well-shaped and sound in limb and constitution. The *crux* of the matter is the choice of suitable stallions. Recently several letters and articles have appeared in the Press advocating the use of Arabs and half-bred sires. An adoption of such a policy would be mischievous in the extreme, for, with regard to Arabs, it is almost impossible to obtain a pure bred, and those bought in Bombay from Indian dealers are at the best only Persian, and, perhaps, not even that. The best and truest shaped Arab seen in Queensland, in recent years, was Farhan, who was 14 hands 3 inches in height, and of the famous Anazeh breed, being procured through the British Consul at Damascus for 1,000 guineas; and as a sire for military remounts, his suitability would be very doubtful. As a matter of fact, it is well known that Arabs cannot compare with the English thoroughbred for either speed or stamina. For, after all, the English thoroughbred is, to a large extent, the Arab, improved in size and substance by careful breeding and selection, and is thus in every way superior to his diminutive ancestors. The opponents of the thoroughbred, however, score a point when they show examples of the many weedy unsound products of our early races; but, fortunately, it is quite possible to select from those bred every year for turf purposes a considerable number of horses who combine with height, symmetry, and soundness, the quality and courage which are found alone in a thoroughbred. The difficulty then exists as to the manner in which suitable thoroughbred sires should be utilised, and how to ensure their use by the breeders, who, as I remarked before, have very generally been more inclined to regard the price of the stallion than his suitability for getting really useful and saleable stock. And here I think the Government should come to the rescue; but opinions will naturally differ much as to the manner in which this should be done. Major-General Hutton proposes a tax on stallions, and doubtless, if such were practicable, it would speedily put an end to the use of cheap and unsuitable sires. The matter is one that has been well threshed out in this colony, and only a few sessions ago Mr. J. T. Bell introduced a Bill to effect this purpose. The provisions of the Bill, however, provoked great opposition, and it had to be withdrawn. Some of the provisions of the proposed Act were possibly faulty, but the result showed that the task was one quite beyond that of a private member. Then there remains, as an alternative, the granting of subsidies to picked and approved stallions, as is done in England. In the old country, the money, formerly voted for Queen's Plates, has now for some years been expended for the encouragement of the horse-breeding industry, by giving subsidies to picked stallions in the same county districts, and has been found to answer well, and has certainly caused a marked improvement in the quality of horses bred by farmers and landowners. In this colony the question of providing the sinews of war has to be considered. A fund might be provided and used in granting premiums for thoroughbred sires in various districts. Then premiums would be given by the Government through the Department of Agriculture, and could be awarded by a competent judge or judges at the various agricultural shows held in each district. The recipients of the premiums should receive an official guarantee and license, and should be required to serve suitable mares in their allotted districts at low rates, so that those breeders, who were accustomed to use cheap and half-bred stallions would be induced to patronise the introduced sires on account of the enhanced price of their progeny. With regard to station-holders who keep stallions solely for their own use, it might be difficult to interfere there, but even these should, I think, be required to obtain a certificate, and, in fact, such would be found conducive to their own interests. If, however, taxation could be imposed on all stallions that did not hold an official certificate of soundness and suitability, so much the better.

There is, of course, a further alternative—viz., that the Agricultural Department themselves provide stallions for the purpose of hiring them out to breeders in the same manner as is being done with bulls in order to improve the

breed of dairy cattle, but this would probably be considered objectionable on account of the expense and risk involved. I think I am right in saying that it fairly comes within the province of the Agricultural Department, so generous in most directions, to assist and guide the horse-breeders in what may be termed a question of national importance. It is, moreover, highly desirable that the Department, should it decide to assist the industry, should endeavour to bring together the breeders and the English remount officials, and that the trade should thus be direct, so that the profits should not go into the hands of the middleman, but should be made by the breeders themselves, who would then find a most profitable trade awaiting them. The position is one that presents very few difficulties, and I cannot too strongly urge on the necessity of taking immediate steps to place the horse-breeding industry on a proper footing, which can legitimately and easily be done by the Department of Agriculture by the method I have briefly sketched out within the limits of this paper. Once given the necessary funds, the remainder of the scheme is one of administration, the most essential point being the securing the best expert assistance in the selection of stallions suitable for the purpose required.

CO-OPERATION IN STOCK-BREEDING.

The *Field* gives some interesting particulars of the success of a scheme for co-operation in stock-breeding, started two or three years ago by the Northumberland Agricultural Society. Eight bulls, of a class adapted to the needs and practices of the country, were purchased with the society's funds, allocated at chosen centres of ready accessibility, and hired out for the use of members at specially low rates. As many as 119 members availed themselves of the services of these bulls for 320 cows, or an average of forty cows to each bull. Encouraged by this success, the society is extending its operations to horse-breeding. The capital at their disposal does not admit of the purchase outright of stallions. But the formation of local clubs to hire high-class stallions is encouraged by the offer of a 30 per cent. subsidy on premiums of over £50 paid for a stallion and a 15 per cent. subsidy on the hiring fee of stallions for which a lump sum of over £200 for the season's hire is paid. Our metropolitan societies in these colonies are, perhaps, hardly rich enough and important enough to engage in this work by themselves, but the principle is an admirable one, and they might attempt it with assistance from the Government. The New South Wales Government did purchase some stud bulls a year or two ago, but the selection was much questioned, and it would be far better to work any scheme of the kind through local societies. To help those who help themselves is a good principle for Government action to go upon. The class of stock-breeding that most needs assistance just now is horse-breeding, and the metropolitan agricultural and pastoral societies all through Australia and New Zealand might well take the matter up and propound working schemes for the importation of good stallions, as well as agitate for a stallion tax, which is also badly needed.

DESTRUCTION OF RATS.

The Australian Pastoralist is responsible for the statement that an American farmer recently killed eighty-two rats by means of whisky-soaked corn. The rats played havoc with his corn, wheat, and other grain; and traps, shooting, and poison failed to get rid of them. Finally he tried the plan of soaking a large amount of corn in whisky, placing it in a barrel where the rats could get at it. The plan was a success, and eighty-two of the rodents were killed, owing to their abandonment of temperance principles. [Will someone, who can afford whisky enough to saturate a barrel of corn, try the above plan, and publish the result?—Ed. *Q.A.J.*]

Poultry.

THE INDIAN RUNNER DUCK.

Since we introduced this useful and valuable breed of ducks to the notice of Queensland poultry-breeders, we have had many inquiries as to its qualities and whence the birds may be obtained. We are informed that at present they are not to be had in Sydney, but that eggs and birds may be obtained through Mr. Minchin, of the Zoological Gardens, Adelaide. The Indian Runner has long been known in England, but only came into favour recently. It is a small bird, attaining a weight of only 4 lb. when full grown, but it is a good table breed, and is remarkable for its prolific laying. It will lay all the year round with only short intervals, and begins to lay when ducks of other breeds have no idea of starting the business. At five months old the first eggs may be expected. The name "runner" is given to it on account of its habit of swift running instead of waddling like all other ducks. In consequence of this habit it requires a wider range than other ducks. Where it has the chance of ranging over swamps and paddocks, it picks up most of its own food, and is thus a most economical bird in that respect. The Indian Runner, furthermore, does not sit. In appearance it is much like the Pekin, standing very upright. It is usually of a brown and white colour, and has a rather long neck. The eggs are of the same size as those of ordinary ducks. These ducks cross well with the Rouen or Pekin, and give a much fuller-breasted bird for the table. The eggs have not the same strong flavour so noticeable in those of the Pekins. They are exceedingly hardy, and no trouble at all to rear. As to their egg-producing capacity, Mr. Pitman, a correspondent of *Garden and Field*, Adelaide, writes that he has (or had, as he probably has a good flock now), nine of these ducks, which in fifteen months from the time of hatching laid 2,483 eggs, an average of 276 eggs each. And again in December, 1899, he said that his ducks were still doing justice to their reputation, having laid 216 eggs for the month ending 20th October, making a total of 2,888 eggs for seventeen months' laying—an average of 321 each. Such a breed of ducks as this surely deserves every encouragement, and we should be glad to see them introduced into Queensland in numbers. The National Association might well offer a prize for an exhibit of the breed.

To those who require further information on the matter, we would suggest a letter to Mr. Pitman, through the medium of the editor of *Garden and Field*, as the former has not given his address in the journal named.

POULTRY NOTES.

Enteritis, or Fowl Fever.—The "Specialist in Poultry" gives the following advice in the Tasmanian *Journal of Agriculture* to those who have poultry showing some or all of the following symptoms:—A tired, sickly appearance, staggering walk, ruffled feathers, the comb and wattles sometimes turning black, great thirst, and constant droppings of the consistency and colour of fluid mustard. The malady is none other than the too well-known enteritis, or fowl fever, a scourge which annually claims thousands of victims throughout the poultry-keeping world, and is occasionally responsible for the devastation of whole flocks. Researches have proved that the disease usually owes its existence to the prevalence of filth, and in nine cases out of ten is due to the fact that fowls are reared and fed on ground which has not been cleansed or disinfected after being soiled by the droppings of many generations of fowls and other animals. The germ of the disease reaches the

ground in the droppings of sick birds. It reproduces itself rapidly in dirty pools, puddles, and manure heaps, such as are frequently seen in the vicinity of dwelling-houses, and hence it is carried about on the feet of passers-by or by animals of the farm. The smallest particle of the droppings of sick birds may produce thousands of poisonous germs. It is only by swallowing one of these germs that fowl fever can be produced. It is most important to remember this. Ducks and geese are not liable to the disease, but turkeys and pigeons are, and it affects all barndoor fowls, irrespective of their breed. Naturally a strong healthy bird would not be so liable to contract this or any other disease. The first signs of sickness are observable three or four days (not longer) after the disease germs have been swallowed. In severe cases the bird will die within twelve hours after the symptoms appear, but the usual course of fever occupies three days.

There is no remedy that can be relied upon to cure this disease. The best course is at once to destroy any bird attacked by it, and, as the disease germs are distributed in the droppings of sick birds, the longer sick birds are permitted to live the greater is the risk of spreading disease. If the bird is a valuable one, and it is decided not to kill the feathered pet, the following course may be taken at once on observing the before-mentioned symptoms :—Isolate the infected birds, confining them in a place from which they cannot escape, and feed them with bread and milk, or a raw egg beaten up in milk, and if possible give plenty of barley-water. It is claimed that a teaspoonful of kerosene given three times a day—morning, midday, and evening—will prove a cure, but there is not sufficient evidence to show that this remedy is thoroughly effective. It is therefore recommended that every bird be destroyed as soon as possible. The bodies of all birds so destroyed, or of birds which die of the disease, should be burnt, or else buried at least 3 feet deep. Separate all kinds showing symptoms, or suspected ones, from healthy ones. Destroy all infected birds, or else shut them up away from other fowls. Watch for great thirst, or fluid droppings; keep fowlhouses clean, and sprinkle freely with quicklime, and be very careful to remove all dung. Fowls are much less subject to this disease when located on sandy or light ground, and it very seldom occurs on ground that will grow grass, or in fact on ground that is covered with any growing substance. The plant life absorbs the animal droppings.

The following items are taken from *Martin's Home and Farm* :—

In caring for the various classes of live stock, the question of labour is always an important item, and the class that requires the closest attention to petty details, as a rule, requires the greatest amount of labour. As poultry-keeping is wholly a business of details, the economy of labour in performing the necessary work is of great importance. Buildings not conveniently located and arranged become expensive on account of unnecessary labour.

The Value of Eggs.—Eggs are the most remarkable product that the farm yields. They are ready for the market the minute they are laid, and the sooner they are gotten to market the better. Nothing else that the farm produces comes in as handy as a good supply of eggs. They require no cultivation, no hoeing, pruning, or churning, but are in a saleable condition as soon as laid. With plenty of eggs on the farm there is a host of good things in the kitchen, and money in the family purse.

Simple Ways to Success.—Successful management does not consist in the kind of feed nor in the particular method of feeding; but the main point is to keep the hens busy and comfortable. The exercise of scratching will keep them in the best condition to produce eggs. The roosts should be made as near the floor as possible, say 3 feet, and be removable, so as to be easily cleaned and washed with some good insect preventive, such as oil of tar, or even lime whitewash. Keeping hens in small flocks pays best, say sixteen to twenty-four in each house; good, warm houses are, of course, necessary. Most farmers lose more than they gain by being too economical with their fowls, especially in winter. Oats fed to laying hens, managed right, will bring the farmer

much profit in eggs, and so will wheat; but clover, scalded, will save bushels of grain and make more eggs. In cold weather boil the maize or wheat when feeding to the poultry. Milk, lean meat, and cut green bone are egg-producers. Have regular hours to feed.

LAYING DUCKS.—At this season stock ducks need the best of care. Every observing duck-raiser has noticed that laying ducks are very touchy and easily excited. A sudden fright may "put them off their feed," as it is termed, and will often require a whole week to get them back to eating—meanwhile they will stop laying.

LOOKING TO THE BREEDING FOWLS.—Scrutinise the birds in the breeding pens carefully, and have none there but those that are in high physical condition. If there are any whose combs are off colour, whose bowels are too loose, or that appear drooping in any way—remove them and put others in their places. When a fowl is "out of condition," if she lays at all, she lays eggs that are physically weak and that won't nourish the embryo chick half-way to maturity; or, if it matures and breaks from the shell, will be but a weak, puny thing, an incubus that the sooner it is out of the way the better.

HOW TO COOL EGGS IN AN INCUBATOR.—Eggs that are too hot can be cooled by sprinkling them with cold water; but great care must be exercised, or they will be cooled too quickly by the rapid evaporation of the water. A good way to reduce the temperature of both incubator and eggs, is to put from a pint to a quart of cold water into the tank, drawing off a similar quantity of hot water from the cock, and open the egg chamber door for a couple of minutes; then close it two or three minutes, and repeat. In this way the temperature of the egg chamber is reduced gradually, and the eggs don't get chilled.

THE CONDITION OF FOWLS.—Fowls selected for breeding should have strong constitutions, should be in perfect health when put in the breeding-pen, and should never have been seriously sick or badly out of condition. Fowls which as chicks were puny or backward, though finally nursed into good condition, are not desirable breeders; nor are those which, though never seriously sick, have been marked as subject to slight disorders. Condition of the breeders is of greatest importance. Hundreds of thousands of chicks are hatched, weak in constitution, predisposed to certain disorders, destined to die prematurely, in spite of all that can be done for them.

FUMIGATING POULTRY-HOUSES.—Remove all nests, roosts and everything that is portable, put a pound of sulphur in an iron pan, with some burning coals, place the pan in the middle of the house, and close up the doors, windows, and all other openings, letting them remain closed for two or three hours. Afterward paint the roosts and nest boxes thoroughly with coal tar, and whitewash the house both inside and out with lime. A spraying pump is very useful to get the lime washed into the crevices in the roosts and walls. It is beneficial to add some carbolic acid to the lime wash. Once a house is thoroughly freed from vermin it is easy to keep it so by attending to it regularly and whitewashing it frequently.

THE MANAGEMENT OF DUCKS.—The management of ducks is not so troublesome as that of fowls, nor is it so costly. Contagious diseases are unknown to the duck tribe; the only weak part of a duck is its legs. Grain feeding generally causes leg-weakness, and the birds break down, droop, and die. A duckling well hatched is half-raised. This means that if the egg has been properly incubated—proper temperature and moisture being kept from the first day up to the last—a strong and normal bird will be the result. The next half of the raising is done in the running and the temperature of the foster-mother. The birds should never be overcrowded, nor should they be neglected in the regular feeding of meals. A fortnight or three weeks will be long enough to leave the ducklings in the foster-mother if the weather is favourable. After leaving the foster-mother they should be housed comfortably every night, and ample room given them, for they grow very fast. The ducklings for breeders should be picked out and given a more nitrogenous food than

those intended for market. The ducklings for market should be kept growing quick, and be fed a more carbonaceous food, and the day they are ready for market they should "go." All ducks, as well as fowls, should be sent to market when ready; every day they are kept afterwards means "eating" at the profits. We have known duck-raisers to keep ducks for five and six weeks after they were ready for market, waiting for a better price. They got it, but they did not consider that the increased price did not pay them for the keep of the ducks. They had better have sold when the ducks were ready, for it cost more for the extra keep than was received in the increased price.

The Aylesburys' Bill.—The Aylesburys are the principal rivals of the Pekin and Rouen in popular favour. They are a pure white breed. A peculiarity of the Aylesbury is the flesh tint of the bill, and this (in perfection) can only be found in and about Aylesbury, where alone can the peculiar white gravel be found which produces it. The breeders in and about Aylesbury give the ducks troughs of water having a layer of this gravel in the bottom, and the constant shovelling of the gravel polishes the bills.

Sulphur.—The need of sulphur in spring for the breeding birds has been amply proved by experiments made in France and elsewhere to test the vitality of eggs for hatching. A noted French scientist affirmed that eggs deficient in sulphur, organic salts, &c., would not hatch well. To test this, sulphur was fed twice a week in the proportion of a dessert-spoonful to twelve hens. An adjoining flock was treated under the same conditions of confinement, feed, and attendance, but deprived of sulphur. The eggs were put in separate trays. Fifty per cent. failed to hatch from the hens which got no sulphur, whereas only 10 per cent. failed to hatch from the hens which got sulphur. Another test showed that the embryos of the eggs of the best laying hens died first, and the percentage was larger than from moderate layers; which conclusively proved that because of their prolificacy the sulphur was exhausted from the food.

South Australian Eggs.—The value of the egg industry to Australia may be judged by the fact that during the past ten years the amount paid for eggs exported from that colony was £381,103, or £108,728 more than the value of the butter exported during the same period. Yet the Chinese are sending cargoes of eggs to Sydney.

EGGS FROM CHINA.

We have over and over again tried to impress upon farmers and others living in country districts, where there are special facilities for breeding and rearing fowls of all descriptions, the value of the egg industry. Now the opportunity is slipping from them in the same manner as did market gardening. The Chinamen came in and planted their vegetable gardens everywhere in the colony where a population, large or small, was gathered together, with the result that the whole business of market gardening has been taken over by them to the detriment of the white man, who has, however, only himself to blame for the loss. Now we learn that the Chinaman has laid hands upon the egg and fowl trade. He is a very shrewd business man, and we may rest assured that he has not entered upon the trade without having well thought the matter out. News has come from Sydney that the Collector of Customs has drawn attention to the extensive importation of eggs from China, which is likely to seriously interfere with the local eggs and the prospects of trade in dressed poultry. On the 28th of May, 3,215 dozen eggs arrived from Hongkong, and nearly 34,000 dozen from other China ports. A day or two later, a steamer arrived from Chinese ports with nearly 28,000 dozen eggs. No doubt some action will be taken in the matter by the authorities in New South Wales for the protection of the local trade. Meanwhile the fact remains that the Chinese mean business.

The Orchard.

FRUIT CULTURE IN QUEENSLAND.

By ALBERT H. BENSON.

CITRUS CULTURE.—PART III.

As I have already dealt with the general cultivation of orchards in the October number of the *Queensland Agricultural Journal* for 1897, and have also given an illustrated description of the implements that, in my opinion, are most suitable for such cultivation, it will be unnecessary for me to repeat what I then wrote when describing the culture of any particular fruit. The principles of and the results obtained by cultivation are the same for all fruits, and may be briefly summarised as follows:—

First.—Cultivation must be thorough—that is to say, the land must be well and deeply worked and kept in a friable condition, indicative of perfect tilth.

Second.—In order to obtain a perfect tilth, the orchard should be ploughed as soon as the crop has been gathered, preferably during the end of July or beginning of August, before the spring growth starts. This winter ploughing should be well done, the soil being turned right over, and all weeds and rubbish, that have accumulated in the orchard during the gathering of the crop, buried. When the trees are young, practically the whole of the land can be ploughed, but as they get older the only land that can be so treated is that outside the spread of the branches, the land covered by the spread of the branches being simply surface-worked. In the case of small orchards where hand cultivation is carried out, the whole of the ground should be dug over with a spade, as this implement does less damage to the roots than that caused by either a digging fork or a fork hoe. A spade cuts clean, but the others drag and tear the roots. The plough is followed by the cultivator, the entire working of the orchard being accomplished by this latter implement during spring, summer, and autumn, up till the time of gathering the fruit. During a prolonged spell of wet weather, the weeds sometimes get ahead of the cultivator; and when this occurs, the plough must take the place of the cultivator, as by its use the weeds can be turned under and rotted down. This ploughing under of weeds is of the greatest value to the soil, as it keeps up the percentage of organic matter (humus) in the soil, and thus renders it more friable. It also increases its power of absorbing and retaining moisture, besides promoting the extremely valuable process known as "nitrification." The cultivator should be used frequently, as the ground must never be allowed to become set, and it must be used after every rain—first, in order to prevent the formation of the capillaries right to the surface of the land; and, secondly, to destroy any weeds that may have started to grow.

Third.—Thorough cultivation prevents the growth of weeds; and as, during a dry spell, every weed growing on the orchard is robbing the trees of the water that they require for their own development, it is essential that they be destroyed.

Fourth.—During a dry time, land that is thoroughly cultivated will absorb and retain any rain that may fall; whereas in the case of uncultivated land the bulk of the rain usually runs off the surface and is lost.

Fifth.—Thorough cultivation is the best remedy against drought, in that, by keeping the surface of the soil in a firm state and never allowing it to set, the surface acts as a mulch, and prevents the loss of moisture from the soil by surface evaporation.

Sixth.—Thorough cultivation keeps the land sweet; ærates the soil, and facilitates the disintegration of the insoluble plant food in the soil, thus rendering it soluble and available for the trees' use.

Where crops are grown between the rows of trees whilst the latter are young, the ground growing such crops should be kept in a state of perfect tilth, and the land immediately surrounding the trees and between them and the crop being grown should be kept well worked and free from weeds; as, unless this is carefully attended to, the young trees will receive a check, and their growth will be, in consequence, unsatisfactory. Where the orchard is planted on a slope, always take care to cultivate across the slope, and not up and down it, and to leave the land as level and free from furrow-marks as possible; so that in the case of heavy rains there shall be little, if any, loss from washing. Where the land is liable to wash badly, extra careful cultivation must be carried out, and, unless crops are grown between the trees, it is advisable to plant a row of small Mauritius beans across the hill between every second or third row of trees, as the mass of vines and roots produced by this bean will bind the soil and prevent its washing.

In concluding these few remarks on cultivation, I do not think I can do better than repeat the advice I gave in concluding the article I have already referred to, viz.:—"There are two great secrets in cultivation. The first is to work the land at the right time, and the second is never to allow a crust to form. After heavy rain the cultivator should be kept going as hard as possible as soon as the land will carry the horses without packing, because the sooner the surface of the soil is stirred after rain the finer will be the tilth obtained and the more moisture will be retained in the soil. Never neglect this, but—Remember that the more moisture you can retain in your soil during a dry time or in a dry district, the better the returns; and neglecting to retain the moisture when you get it very often means the loss of your crop. You cannot over-cultivate if you cultivate properly. Stir the land, and stir it deeply. Do not turn the soil. If you do, you bring moist soil to the surface, and consequently lose moisture; therefore, use a cultivator with narrow teeth, that will stir but does not turn the soil."

Pruning.

The first pruning that the young citrus tree gets, usually takes place in the nursery row, but if this has been neglected it must be done as soon as the tree is planted in the orchard.

The young tree must be trained to a single stem, all side growths being removed; and when strong enough, it should be headed back to a height of from 18 inches to 2 feet from the ground. When headed back, the tree should be allowed to develop three, four, or five branches which should be started from the stem in such a manner as to produce a symmetrical and evenly-balanced head. All other shoots than those required to form the main branches of the tree must be removed. After the head of the tree has been formed, all the pruning that is necessary is to cut away every crossing and superfluous branch in the centre of the tree, and all branches that have a tendency to grow downwards and rest on the ground. No branch should be allowed to grow that cannot get right to the outside of the tree, or that is crowding out other branches The idea aimed at in this method of pruning is, to keep the centre of the tree open and to have all the bearing wood and foliage on the outside, so that whilst the trunk and main branches of the tree are easily accessible, they are at the same time protected from the direct rays of the sun. This keeping the centre of the tree well opened up is of the greatest assistance in keeping both insect and fungus pests in check, as it enables their presence to be detected at once, and facilitates their treatment by spraying or otherwise. If the young trees are properly started and their pruning is carefully attended to for the first few years, there is seldom any occasion for the severe pruning which is often necessary in the case of neglected trees, especially seedlings, where, in many instances that have come under my personal observation, fully one-half of the wood has to be cut away. The

pruning of such trees is by no means an easy job, as they are usually very dense and very thorny, and both the saw and pruning shears must be used freely in order to open out the centre of the tree, as previously described. After such a pruning, the tree often throws out a number of water sprouts all along the main branches, and these should be rubbed off as soon as they make their appearance All thorns should be cut away when pruning, and once cut they are done with, as they will not grow again. The pruning of citrus trees is confined to the lines I have described, and cutting back, as practised in the case of deciduous trees, is only necessary when there are long straggling growths that require shortening back. The tools best adapted for pruning citrus trees are a good pair of 9-inch shears, a California pruning saw, and a strong pair of leather gauntlets for use in the case of thorny varieties and especially seedling trees. The pruning of young citrus trees can be done at any time, although it is best to avoid periods of active growth; but the severe pruning of old trees can only be done when the tree is in a semi-dormant condition; preferably during the winter months.

In addition to pruning for forming or shaping the tree, pruning is sometimes necessary for renovating it. This is the case where its roots are found to be still strong and healthy and the top of the tree is, more or less, useless and full of dead wood, caused either by neglect to prune, insufficient cultivation, exhaustion by over-cropping and want of manure, or by the ravages of scale insect or borers. Such a tree should have the entire top cut away, nothing but sound wood should be left, and only such branches as are necessary to produce a symmetrical tree. These branches will throw out fresh shoots, and these should be thinned out, only leaving enough to form a good head. Such pruning often necessitates the cutting away of large limbs, and the cuts should be carefully made and trimmed, and the wound should be covered with white lead, grafting wax, or any similar material, to encourage its healing and to prevent the wood from dying back and destroying the tree.

MANURING.

If the right kind of soil, as previously described, has been chosen for the citrus orchard, it is seldom necessary to manure the trees for the first few years, as their growth will be found to be sufficient without it. When the trees come into bearing, however, manuring becomes necessary in all soils, except those that are unusually rich in plant food, and even these, eventually, become more or less exhausted, and require manuring in order to produce paying crops of fruit and to maintain the trees in a healthy and vigorous condition. When an orange orchard is in fair bearing it should produce, at least, 400 cases of fruit to the acre, and, estimating that each case contains 50 lb. of fruit, this gives a total of 20,000 lb. of fruit to the acre. This quantity of fruit takes the following plant foods from the soil—namely: 38 lb. of nitrogen, 10 lb. of phosphoric acid, and 42 lb. of potash; and in order to supply this, 185 lb. of sulphate of ammonia, 59 lb. of superphosphate, and 84 lb. of sulphate of potash, or their equivalents in other manures, will be required. The quantities are calculated on the analysis of the orange published in the article on orchard manures, which appeared in the December number of this *Journal* for 1899; and the manures are taken as being of the standard quality then quoted. If the fertility of the orchard is to be maintained, this plant food, which is taken from the soil by the fruit, must be returned; and the question we have to consider is, how to obtain and apply this food so as to obtain the best results at the lowest cost.

It will be seen from the analysis that oranges take a large quantity of nitrogen and potash from the soil, and only a comparatively small proportion of phosphoric acid; still as this latter plant food is often deficient in Queensland fruit soils, very good results are usually obtained by its application, whether the same be in the form of bonemeal, meatworks manure, boiling-down refuse, or superphosphates. The large quantity of nitrogen required, shows the necessity for maintaining a good supply of organic matter or humus in the soil. The percentage of available nitrogen in the soil depends on there being a sufficiency

of humus present, as, no matter what nitrogenous manures are applied to it, unless the soil is in such a condition that nitrification can take place rapidly, such manures will have little effect. This brings us to the question of what manure to use, and, as the analysis shows, this must be a complete, and not a special manure. Personally, I am in favour of applying the manure in the bulky form of compost rather than in the concentrated form of commercial fertilisers, for if the compost is well made, it will be rich in organic matter, the inorganic plant foods that it contains will be evenly distributed throughout the mass, and when applied to the soil the trees will derive immediate benefit therefrom, as it will be in such a condition that it may be readily assimilated Such a compost heap should consist of a mixture of soil, bush scrapings, weeds, cane trash, cornstalks, stable, cow, pig, or fowl manure, straw, cleanings out of drains or waterholes, peaty or swampy soil, or any other available waste vegetable matter about the place. It should be turned once or twice, in order that it may become thoroughly rotten. and previous to using it should be carefully mixed with the commercial fertilisers that have to be added to it in order to make up the necessary amount of the various plant foods that are required. Such commercial fertilisers should consist of a mixture of boiling-down refuse, or meatworks manure, superphosphate, sulphate of ammonia and sulphate of potash, or where butchers' offal, consisting of blood, entrails, bones, &c., is available, it may be used in the place of the meatworks manure Such offal should be added to the compost heap from time to time as obtained, and should be well mixed with peat, stable manure, or soil, so as to present any loss of ammonia and also to prevent any disagreeable odour arising from the compost heap. To every ton of such compost, add 1 cwt. of the following mixed commercial fertiliser, the composition of 1 ton of which is as follows :—

Meatworks manure (blood and bones)	10 cwt.
Superphosphate	4 ,,
Sulphate of potash	4 ,,
Sulphate of ammonia	2 ,,

This fertiliser will contain about $5\frac{1}{4}$ per cent. of nitrogen, 10 per cent. of potash, $10\frac{2}{5}$ per cent. of phosphoric acid, of which $3\frac{2}{5}$ per cent. is water soluble, and is worth £7 per ton. When added to the compost in the proportion of 1 cwt. of fertiliser to 1 ton of compost, a fair manuring for trees bearing an average crop would be 10 tons to the acre, and this should be spread carefully all over the orchard previous to the winter ploughing, and should be ploughed in. Such a manure will be found to be both rapid in its action and lasting in its effect, as, whilst a portion of the plant food it contains is available for immediate use, there is a considerable portion that becomes only slowly available in the soil. This is preferable to the use of all quickly soluble manures, as it maintains a regular supply of plant food for the trees, instead of giving it all at once. There is one other advantage in mixing the commercial fertilisers with the compost heap, and that is, the bulk of the compost absorbs and retains the soluble portions of the commercial fertilisers and prevents their being washed out of the soil to any extent, should heavy rains follow their application.

Farm manure is excellent for citrus fruits whenever obtainable, and every grower of such fruit should see that this valuable material is not wasted, but that it is either used by itself or mixed with the general compost heap. Every citrus-grower, who will take the trouble to do so, is able to make either a good heap of farm manure or a large compost heap without any extra expense other than labour. All that is required for the former is to grow a quantity of green food for the horses and cows, and, instead of letting them roam all over the place at night, to confine them in a yard with a rough shelter attached, and in which their food is placed, and to litter the yard with a quantity of rough grass, weeds, ferns, or other material that will act as an absorbent for the solid and liquid excreta of the animals. This extra labour will be found to pay, not only in the manure that is obtained thereby, but in the

improved condition of the horses and the increase in the yield of milk and butter of the cows. Artificial fertilisers may be used by themselves, and if the land is poor, from 4 to 6 lb. per tree up to trees of five years of age, of the mixture previously given, will be sufficient, and this should be applied in two lots. Trees in bearing will require from 10 to 20 lb. per tree, also applied in two lots; first in July or early in August, and again in January. The manure should be broadcasted round the trees and should be either chipped or cultivated in. If desirable, blood or nipho may be used in the place of sulphate of ammonia as a source of nitrogen, but if used in too large quantities these manures are apt to make the fruit coarse and thicken the skin. Potash manures have a tendency to produce somewhat acid fruit, whereas inorganic nitrogen has a tendency to produce sweet fruit. In the case of sandy soils, it may be advisable to increase the proportions of nitrogen and potash in the composition of the commercial fertiliser, and the use of a compost rich in humus would be especially valuable in such soils, as it would tend to increase their power of absorbing and retaining moisture during a dry spell.

Mulching for citrus fruits should take the form of a soil mulch produced by thorough cultivation, or in the case where a quantity of soil has been washed away from the tree roots by heavy rain, a good mixture of top soil and bush rakings, or good compost should be spread round the trees, as this is preferable to mulching with farm manure, cane trash, megass, cornstalks, &c., as all these substances tend to draw the roots of the trees to the surface, and when a dry spell comes, the trees suffer in consequence. Compost all such materials, plough the compost in, and keep the topsoil in fine tilth with the cultivator, as a good soil mulch is the best of all mulches for citrus trees.

HANDLING THE FRUIT.

Under the above heading, I will deal with the gathering, sweating, packing, and marketing of the fruit. In the first place, I wish to impress upon every citrus-grower, the extreme importance of careful handling. No fruit is more easily injured by careless handling, and none requires greater care in gathering and packing if you wish to obtain satisfactory returns from your orchard. Handle like eggs, and not like road-metal—a bruised fruit is a spoilt fruit, and not only will it not keep, but it will tend to rot any sound fruit that are packed near it.

No citrus fruit should be pulled from the tree, but should be carefully cut. Pulling injures the fruit, and often prevents its keeping. Several kinds of clippers have been made for cutting the fruit, but they are not obtainable in Brisbane, the best substitute that I have seen being a small pair of shears with blunt points and both blades sharpened. This cuts very close, and there is little danger of injuring the fruit, as is often the case when ordinary pruning shears with a sharp-pointed cutting blade are used.

When cut, the fruit should be placed in a basket or bag, and when same is full, it should be carefully emptied into a case, taking every possible care not to bruise the fruit while doing so. The cases containing the fruit should be carried or carted to an open shed, where they should be stacked and allowed to remain without being touched for from four to six days before it is packed. This detention in the cases prior to packing is to permit of the evaporation of the surplus moisture from the skin of the fruit which, instead of being rigid and brittle as it is when gathered, becomes tough and leathery and the fruit can be handled and packed without injury. This evaporation of surplus moisture from the skin is termed sweating, and it is an essential operation in the case of all thin-skinned fruit that have either to be carted over rough roads, or that have to be exported to any southern or foreign markets. This period of detention between gathering and packing also enables all fly or moth infested, pricked or bruised fruits to be easily culled out when packing, as the injuries are then much more apparent than at the time of gathering.

PACKING.

Owing to the fact that there is no standard size of fruit case, I am unable to write about packing as I should wish. All that I can say is that, in my opinion, the various cases at present in use are as unsatisfactory as they can well be, and are absolutely unsuited to an export trade. With the present narrow cases it is impossible to pack an even grade of all sizes of fruit, as can be done with both the Italian and American cases, which will pack a graded sample of any sized citrus fruits of from 2 to 4 or more inches in diameter, so that the sample will be even throughout, and will fill the case properly. However, as narrow cases are in use here, we must pack them as best we can, and in order to do this the fruit should be graded for size and quality, and the different grades should be packed in separate cases. Pack the fruit firmly and see that the case is well filled, as, if slackly packed, by the time the case reaches the market, the fruit will have started to rattle about and will be considerably bruised and lowered in value in consequence. Pack honestly, grade your fruit carefully, and send to market in new clean cases if you wish to get good returns, and rest assured that for any extra trouble or expense that you may be put to in this respect you will be handsomely repaid. When we have decided on the size of the standard case, or of the case for export, I will go into this important question very carefully and in detail, and will give full particulars and illustrations in this *Journal* for the guidance of all citrus-growers.

CYANIDING TENTS.

By ALBERT H. BENSON.

A number of inquiries having been received by this Department as to the material required and method of making bell tents and sheets for cyaniding fruit trees, the following information, together with the accompanying illustrations, showing the method of cutting the cloth, will, I trust, prove of value to fruitgrowers.

In the first place, as to material, we have tried many different kinds, with the result that we are now using nothing but the very best quality of duck; the particular brand that we have found most satisfactory being marked "Heavy Cotton Duck Canada D," in an oval.

We are also using what is known as the Willesden rot-proof canvas, which is a first-class quality 16-oz. duck, treated with a copper solution in order to render it more lasting, and to prevent its becoming mildewed. This material is giving very satisfactory results, being more gas-tight than any undressed duck. We are also testing a finely woven but much lighter texture of duck, which, so far, promises to be very suitable, but, before recommending same for large sheets, we purpose testing it thoroughly.

No first-class duck requires to be treated with oil, or other similar substance, to render it gas-tight, as it is sufficiently gas-tight for all practical purposes without any such treatment. At the same time it is advisable to tan both bell tents and sheets by placing them in a strong tan bath, the tanning material used being either wattle-bark, ironbark, din-din, or other suitable tanning material.

The object of this tanning is to prevent the tents or sheets from rotting, or from being covered with mildew. In the case of the two smaller sizes of bell tents, lighter material, such as strong calico or Mexican sheeting, may be used, provided that it is thoroughly dressed with raw linseed oil, but, though more gas-tight, it will not be as strong or as durable as the best quality duck, as the oil has a tendency to rot the material to which it is applied. If oiled tents or sheets are used, they must be thoroughly dried before they are folded up, otherwise there is every chance of their being destroyed by spontaneous combustion. In the Departmental outfit we are at present using five sizes of

bell tents, but as we have found by experience that the largest size now in use is unwieldy, we shall make no more of this size, but stick to the four sizes, particulars of which are given below, and the method of cutting the cloth for which is given in the accompanying illustration. The illustration, which explains itself, is reproduced from drawings and calculations that have been made by Mr. J. Henderson, the manager of the Redland Bay Experiment Orchard, who had charge of the cyaniding outfit for several months.

No. 0 Bell Tent is made of five widths of 36-inch duck, 6 feet 4 inches long, and will treat trees up to 4½ feet in diameter by 5 feet in height.

No. 1 Bell Tent is made of seven widths of 36-inch duck, 8 feet long, and will treat trees up to 6½ feet in diameter by 7 feet in height.

No. 2 Bell Tent is made of nine widths of 36-inch duck, 12 feet 6 inches long, and will cover trees up to 8 feet in diameter by 11 feet in height.

No. 3 Bell Tent is made of eleven widths of 36-inch duck, 14 feet 6 inches long, and will cover trees up to 10½ feet in diameter by 12 feet in height.

Even larger trees than those given can be covered by the various sizes of tents by tying in straggling growths, and thus bringing them within the measurements given. In order to cut out the duck so as to get the dome of the tent exact, cut off a length of duck according to the size of the tent you desire to make, and fasten it securely to a floor. Run a chalk line the whole length of the cloth from centre to centre, and set off cross lines at right angles to this centre line with a square, at the distances given in the plan. Mark off on these cross lines the distances as per plan, and connect same with a curved line, which is the line on which the cloth is cut. Having cut out one width, it is an easy matter to cut out as many as may be required.

All the sewing can be done by machine, using a strong linen thread (No. 26), and making about ten stitches to the inch. All seams have a lap of an inch, and are sewn with two—or better still—three rows of stitches. As shown in the plan, the top of the tent (the cap) is circular, and the method of sewing adopted is as follows:—"First sew three or four widths together, then sew the top on to them; then add three or four more widths and complete sewing the top to them, and so on, till you arrive at the last seam; then complete sewing on the top. When this is done, you start the last seam at the top, and complete the three rows of stitching for a yard or so down, or as much as the machine can take, and continue sewing in short laps until complete."

The above method of making the tent is that adopted by Mr. Henderson, and experience has proved it to be satisfactory. In tents Nos. 1, 2, and 3, an extra circle of duck is sewn on the apex of the tent, and to which is attached a ring of 1½-inch rope, about 5 inches in diameter, with which the tent is placed on and taken off the tree to be treated. In tents No. 2 and No. 3, four hobble rings are sewn on to the bottom edge of the tent, equidistant from each other, with which to put the tents over the trees, as the rings of gaspiping used in our first tents have been done away with, and this method of placing the tents over the trees substituted for it. In addition to bell tents, we use three sizes of sheets which are approximately 40, 50, and 56 feet in diameter respectively. A 40-foot sheet will cover trees about 15 feet in diameter by 15 feet in height; a 50-foot sheet, trees about 20 feet in diameter by 20 feet high; and a 56-foot sheet, trees about 20 feet in diameter by 24 feet in height. Larger trees require two or more sheets, as sheets above 56 feet in diameter, if made of heavy duck, are too heavy and cumbersome to be worked satisfactorily.

All sheets are octagonal in shape, each side being of equal length.

A 40-foot sheet is made of fourteen widths of 36-inch duck, of which six widths are cut 41 feet 3 inches long, which, after allowing for a lap of 2 inches at each end to prevent fraying out, gives a diameter the long way of the cloth of 40 feet 11 inches. This is equal to the diameter across the widths of the cloth, as fourteen widths give 42 feet less 13 inches for seams, or a width of 40 feet 11 inches in all.

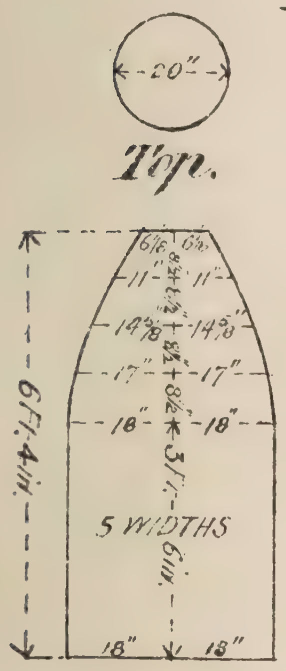
Plate I.

Sketches of Bell Tents Nos 0.1.2 & 3

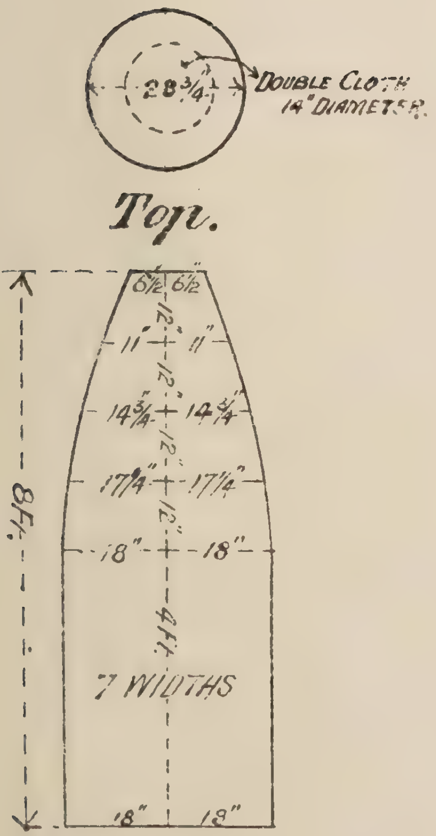
Showing dimension for cutting Widths and Tops. 1 inch is the width allowed for all seams. All measurements are given in feet and inches.

— *Note.* —

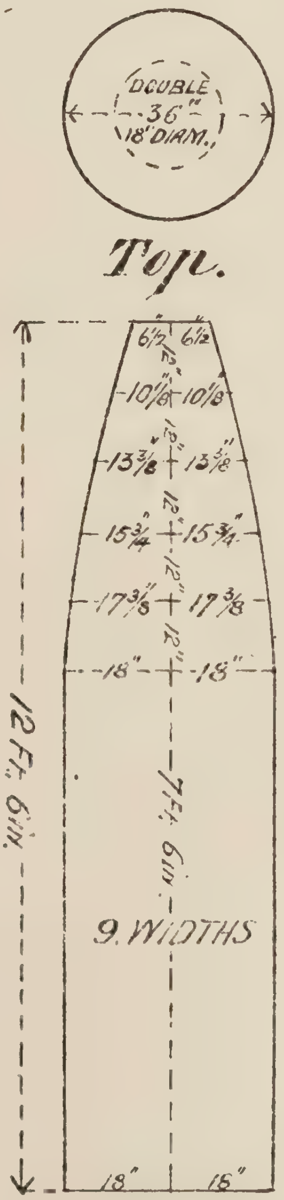
No. 0. Covers trees 4½ft. diameter by 5ft. high. No. 1 covers trees 6½ft. diam. by 7ft. high. No. 2 covers trees 8ft. diam. by 11ft. high. No. 3 covers trees 10½ft. diam. by 12ft. high.



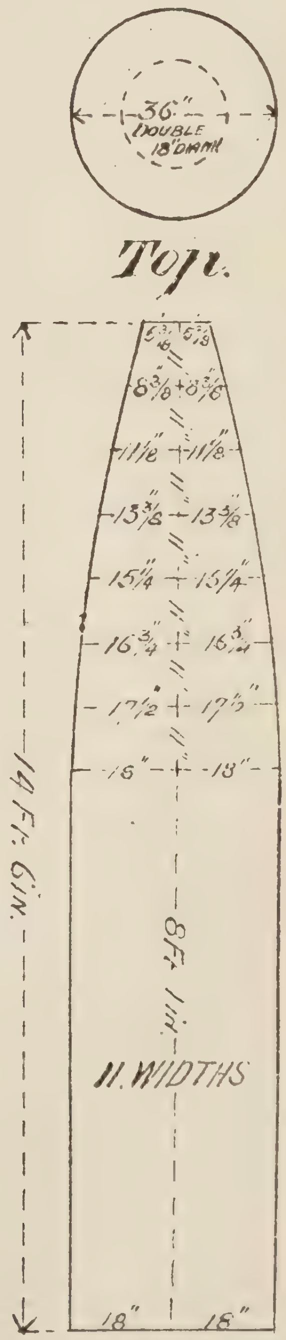
No. 0.



No. 1.



No. 2.



No. 3.

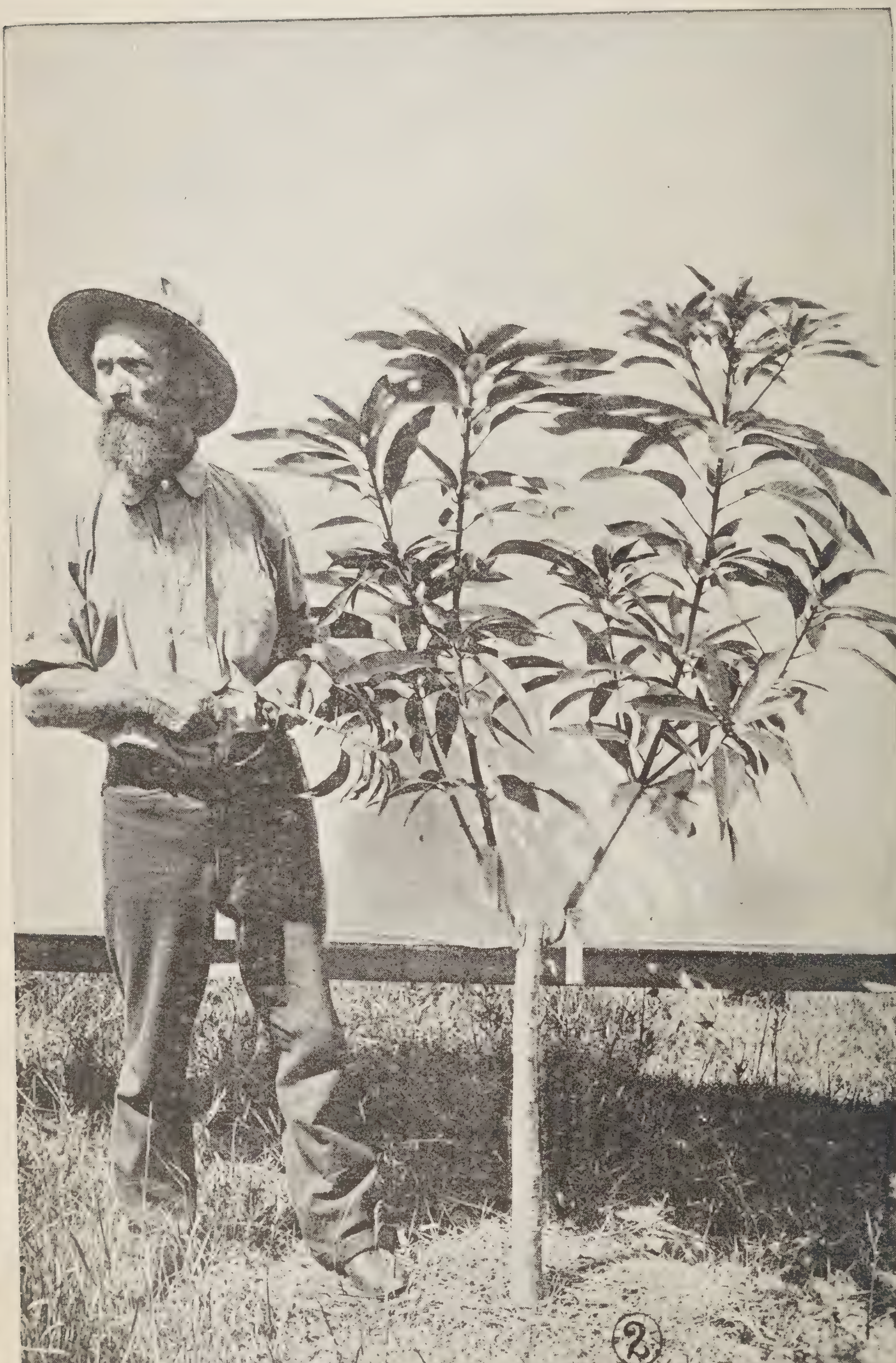
Scale ¼in. to 1ft.

Plate II.

GRAFTED MANGO TREES.

[illegible]

Plate III.



GRAFTED MANGO TREE.

On each side of the six widths going the whole diameter of the sheet are four widths, which, instead of being cut off square, are cut at an angle of 45 degrees, as this angle will produce a regular octagon. In order to get an angle of 45 degrees, mark off one yard of cloth, and draw a line from corner to corner diagonally across it, and you will get what you require. There is no waste in this method of cutting out, every particle of duck being used.

A 50-foot sheet is made of seventeen widths of 36-inch duck, of which seven widths are cut 50 feet long, which, after allowing 4 inches for the ends, gives a diameter the long way of 49 feet 8 inches, the same as that obtained by the seventeen widths, or 51 feet less 16 inches for seams. There are five widths on either side of the seven through widths, and they are cut in the same manner as that described for the 40-foot tent. A 56-foot tent is made the same way as a 50-foot, with the exception that a 3-foot width of duck is sewn on all round it. These measurements do not give absolutely correct octagons, but they are near enough for all practical purposes.

GRAFTING THE MANGO TREE.

Part I.

By HORACE KNIGHT.

The object in grafting is to perpetuate any desirable fruit without having recourse to seeds.

The method shown on Plate II. (1 and 3) is easy, quick, and profitable. Plate II. (1) shows a tree that has had its entire top cut off, and fourteen different varieties of mango have been grafted on it, and all of which are growing. It is not necessary to have so many different varieties on one tree, unless by way of experiment or with a fixed purpose. Most of the new leaves were cut off to obtain a clearer view of the work. The grafting was done on the 27th February, 1900, and the tree was photographed on the 14th April, some of the new growth measuring 7 inches in length. Plate III. shows a mango tree grafted on the 27th March, 1899, and made a growth of 3 feet 6 inches in twelve months without any cultivation. Experiments have proved beyond a doubt that sections of the mango tree will keep good for grafting purposes from three to six months' time, according to variety and to the constitution of the tree from which they are obtained. This gives us the opportunity to import sections of the most desirable class of tree from any part of the globe with a certainty of their growing when properly prepared and tied on.

It has been suggested that there is some room for improvement in our mangoes, and the writer is of that opinion also. We can certainly improve what we have, and how to do that will be dealt with in a subsequent issue.

After twelve years' close observation and a large number of experiments (more or less useful) made on the mango tree, the conclusion I have arrived at is, that no other tree is simpler to graft. The work can be successfully done by any one and at any time, whether the sap is active or dormant. The buds are certainly not so quick in coming when the sap is down, but they make up for any delay when once started.

Still, it cannot be said that grafting, when the sap is down, is the best time for the operation. On the contrary, the first three months in the year have proved to be preferable. All the remarks in this article apply to one process only—that is, the use of bark without any wood adhering to it. Up to date, the best

material for tying on the grafts is ordinary candle cotton, procurable at the ironmongers, and generally sold in 1-lb. balls. Plate II. (3) shows a mango tree with grafts growing in several places, and one graft tied on with the candle cotton. The grafts are simple pieces of bark, without any growth whatever on them. Of course, there must be dormant buds, or eyes, on them. The pieces of bark may vary in length and width according to size of trunk or limb on which they are intended to be engrafted. The grafts shown on Plate II. (3) measured $2\frac{1}{4}$ inches long by $\frac{5}{8}$-inch wide for the smallest piece, and $3\frac{1}{4}$ inches by $1\frac{3}{4}$ inches wide for the largest size. But the most convenient size to use is a piece about twice the length of the width, and if taken off where rings exist, so that the ring is across the centre of the section, there will be two or three latent buds near the ring. The rings on the trunk and limbs denote the exact number of growths and rests the tree has made. At the point of every new growth, while resting, there is a whorl of leaves, and at the base of every leaf there is a bud which is capable of becoming a tree, and, whether it is used for grafting during its infancy or ten years afterwards, it will develop with proper treatment. The youngest bark used on the tree shown on Plate II. (1) was four years old, and the oldest section nine years old, when transplanted. The older the bark, the easier it is to remove, and it is much handier to trim into shape. First cut out the section for transplanting, and, should the edges be bruised or torn, cut them away to sound bark. Now press the piece firmly on to the spot where it is intended to grow, and make a clean cut all round. Next take out the bark inside the mark, and put the prepared section in its place. Do not make it fit so tightly that it has to be squeezed in, but make it a nice fit. Now bind it on with the candle cotton with just sufficient pressure to make it touch its new parent. Avoid if possible binding immediately over the buds. The old notion that all air must be excluded to effect a union is a delusion so far as grafting the mango is concerned. There is no necessity for clay, grafting wax, or any other nasty stuff to ensure a good union, but just the candle cotton. Now, it may be that a section of bark has been prepared for transplanting which is much thicker than the piece taken out. Well, never mind; tie it on, and it will grow, although it is not a comfortable fit. Should the weather be hot and dry when the grafting is being done, the top may be left on the tree for shade, but it must be thoroughly ringbarked 6 or 8 inches above the graft. In two or three weeks' time cut the top off at the spot where it was ringbarked, and if the buds on the graft have started into growth remove the binding. All young shoots, except those on the grafts, must be rubbed off as soon as they appear. When a vigorous mango tree is suddenly deprived of all its leaves and the majority of its limbs, it immediately sets to work to repair the damages. Its ordinary means of utilising the sap being removed, it makes determined efforts to replace them. Every dormant bud will rapidly spring into growth, and while these are coming on the trunk and remaining limbs will swell out to a surprising degree, this being the only means of using up the sap which the undisturbed roots are still pumping up. At this stage the tree is highly impregnated with sap, and will take kindly to almost any shape or sized pieces of bark that may be put on it. When a piece of bark is removed while the tree is in this condition, the sap will pour into the breach, and a union with the bark introduced is soon effected.

A NEW PACKING MATERIAL FOR FRUITS.

An interesting experiment has just taken place in the matter of packing fruits in the colony of Victoria for shipment to England.

As is pretty generally known, apples and pears are now brought from the Cape of Good Hope and from Australian colonies in boxes holding a bushel, which are stored on board ship in cool chambers. These chambers, or

refrigerators, have been provided by the steamship companies at a considerable outlay of money. The fruits are merely wrapped in tissue and placed in the boxes.

Under this system, apples have for the most part come very successfully; but pears have been less satisfactory. Occasionally there have been pears from the Antipodes that have reached this country in a sound condition, but numerous consignments have proved to be of little value, and the commission agent is never able to speak of such fruits, or to gauge their value until they have been unpacked. The freight per bushel from Victoria to London for apples or pears so packed and stored on board ship in cool chambers is 3s. 9d.

Such are the circumstances of the present system, and the amount of freight paid for passage.

And now for the experiment, for intelligence of which we are indebted to Mr. J. B. Thomas, a well-known fruit salesman in Covent Garden, to whom the fruits which have been the subjects of experiments were addressed.

Instead of packing the apples wrapped in tissue only, in the case of several bushels that have recently arrived in London by the s.s. "Wakood," a quantity of asbestos or a preparation of this substance has been used. The fruits were wrapped in tissue as formerly, and afterwards embedded in the asbestos, each fruit being perfectly surrounded by this substance. Upon unpacking the case, the asbestos appeared to be caked, but it was easily broken up, and then appeared almost like flour. We should suppose, therefore, that the fruits would be air-tight under such conditions, and this will account for the fact that as we saw them they were perfectly sound and in excellent condition, although five months had elapsed since they were packed in the boxes. The apples were grown by Mr. J. R. Warren, Mount Alexander Orchard, Harcourt, and Mr. J. M. Ely, Rosehill Gardens, Harcourt, both large Victorian fruitgrowers. They were packed and brought to this country under the direction of Mr. Geo Pontin, Church House, Yapton, Sussex. The apples were gathered and packed previous to 5th May last, but owing to some objection, we believe, on the part of the steamship companies, there was a delay of two months or more before shipment, and even then they travelled by the Cape route. The companies, naturally perhaps, object to the introduction of a new system of packing fruits that may render unnecessary the cool chambers that have cost so much money to provide But such objections will, no doubt, be overcome, and if a syndicate be formed, as is now proposed, the system will be given a conclusive trial. The new system, should it answer to expectations, will possess several advantages. The fruit may then be stored in the "hold of the ship, and the freight per bushel case will be 6d. instead of 3s. 9d.; but, as the packing material will displace a quantity of the fruits in each package, it may be well for present purposes to describe the future freight of the fruit as 1s. per bushel.

It must be remembered also that the asbestos is a valuable material in England, and it will be sold here to as much advantage as will the apples. The result will be that the asbestos and fruit would be brought to England for less money than is now paid for the fruits alone. The apples will travel as well or better, and it is thought they may be preserved after arrival here for weeks if necessary, providing that the cases be not opened in the meantime. And, beyond the other considerations, it is hoped also that Victorian pears by this system may be placed on the English market without much risk of loss by decay.—*Gardeners' Chronicle.*

Viticulture.

NEW PROCESS OF WINE-MAKING.

A process for the production of wine has recently been brought out in France, which has been successfully put to the test, especially with the making of red wines. It consists in subjecting the grapes to the action of heat before crushing. The results are:—

1. The solution of all the red colouring matter of the grape in its own juice before fermentation.
2. The sterilisation of the must.
3. The production of wine of a superior quality to that of the normal samples from the same grapes by the old methods.

The experiments which have led to the above results and conclusions were made on the vintages of 1897 and 1898, both in Tunis and in France. More than 100 tons of grapes were thus heated at seven different observation stations. All the resulting wines, without exception, have been better than those from the same grapes under the traditional conditions.

Amongst other things it has been shown by these experiments:—

1. That the grapes thus heated for the purpose of dissolving the red colouring matter in the juice lose their resistance to pressure, and hence give a greater yield of juice than the non-heated.
2. The juice extracted under the press has a richer colour than that allowed to run out under natural or very slight artificial pressure.
3. The wine resulting from this fermentation has more colour and more "body" also than that from the old process, which is the reverse (without pressure) of what has always been observed in comparing the first and last "crus" by the cold process.
4. The sterilisation of the "must," obtained by heating, permits the careful study of the effects of various kinds of ferments upon the same juice.

In this connection, there have been employed, experimentally, ferments of various kinds, including those from some of the most celebrated high-grade wines or *grands vins*.

The tasters could detect no difference among the various wines produced from the same must by use of different ferments. There was, however, a difference in the alcohol percentage. All the new process wines were richer in alcohol than those made by the old method from the same grapes. But those made with "cultivated" ferments gave rather poorer results than those with the natural from the "grands crus."

5. In districts infected with the "tourne" disease, the wines made by the new process were the only ones which were exempt.

Tropical Industries.

COFFEE CULTURE IN QUEENSLAND, No. 4.

PULPING AND CURING.

By HOWARD NEWPORT,
Instructor in Coffee Culture.

In the regular course of things, this article would have dealt with pitting, planting, &c; but by special request of the Cairns District Coffeegrowers' Association, I am dealing with the matter of pulping and curing.

The crop having been picked, it must be transported to the pulping-house; to facilitate this, it is best to have a large sack, basket, or barrow for each picker, into which he can empty the little bag round his waist from time to time. These have to be wheeled in, if barrows, or brought in in drays. In many countries where very large areas are opened, often on steep land, various methods of saving time and transport are resorted to, such as wire rope shoots, and tin, or zinc, piping with water; but here in Queensland, on the small areas cultivated, these will not be found generally necessary, and on flat lands would not be found possible.

The usual rates paid for picking, where this can be given out on contract, are from ½d. per lb. to 1d. for 3 lb. This is somewhat expensive, though I have no doubt that, with the methods of work hitherto in vogue, it needed a hard day's work to make a fair wage. As the work is better understood, and what may be called the "knack" of picking grasped, a good picker should not only be able to pick cheaper, but earn a good wage at 4 lb. per 1d. at least, provided the trees are pruned and the crop fairly regular.

The present system of weighing also is a very unsatisfactory one, the outturn from weight being so uncertain. If wet weather is experienced, the pulp or fruit part of the berry is so much larger and heavier that the amount of clean coffee obtained from it cannot be even approximately estimated. If weighing is adopted it should only be done when the coffee is dry, and as this is impossible in contract picking, it would be better to go entirely by measure. Not only is measuring easier and quicker, but it is everywhere done, coffee never being weighed until dried and cleaned. In this way, for estate calculation, 180 to 200 bushels mean a ton of clean coffee according to the season, a test being made of a bushel from time to time. If contract picking could be paid for, or calculated, by the pint or quart instead of by the lb., it would be found not only more uniform for purposes of estimate, but more satisfactory for both the picker and the owner.

On being brought in, the cherry should be measured and put all together into a cherry loft or vat. This should be made of wood (iron or tin may rust and contaminate the coffee), and may be of any size required; 6 feet by 10 feet is a fair size for a small estate, and the vat should have sloping sides, and be about 4 feet deep where the sides should meet, and where a small outlet for the crop, some 4 inches or so square, may be made. This loft or vat should be above the pulper, and so arranged that the cherry, once put in, need not be handled again, and will automatically fall through the opening at the bottom, and is there checked and regulated by a sliding panel door or automatic feeder. Sometimes cherry lofts with flat floors are used, but the sloping vat is better, as it saves labour. The system of having the cherry in a box or tub alongside the pulper, and bailing it up into the hopper little by little with a dipper, is a very slow process, and a waste of time and labour; while the upstair loft or vat can

be built in at very little cost, and access made to it by means of steps or a ladder. If the pulp-house is built on sloping land by the side of a creek, and the soil cut away to form the lower floor for the pulping machinery, washing vats, &c., access to the cherry loft is easy, it being level with the ground on one side.

Once in the vat, the cherry should be pulped as soon as possible. If feasible, it is advantageous to get it through the pulper the evening of the day it has been picked, or first thing the next morning, so that the process of fermentation, which begins naturally as soon as picked, may not take place in the cherry. If unavoidable, the pulping can be delayed for twenty-four hours or so, but the cherry must, in this case, be spread out and watered lightly with a watering can. This is to prevent drying; for if allowed to dry it will get cut in the pulper. If left heaped, it will get hot, ferment, discolour the parchment, and so spoil the sample.

Pulping.—Pulping machines are of various kinds; the better kinds and those most commonly used are the "Breast" and "Disc," the latter working vertically, and the former horizontally.

The breast pulpers are manufactured in London, and cost, for the single or small size, from £14 upwards to £90 or £100 for the largest and most elaborate.

This machine has a cylinder or drum working on an axle in bearings, and turned by a handle or by power, as the case may be; this drum, being covered with a sheet of thin copper punched into small but regular and even excrescences, crushes the cherry by pressing it against a cast steel-plate set in front of it. This latter is called the "breast," and it is from this that the machine derives its name.

The setting of the machine is accomplished by means of screws which move the breast nearer, or further away, as may be desired.

The small machines have the drum from 1 foot to 14 inches in diameter and about 6 inches wide, giving only one outlet for the pulped beans in front, while the larger have the drum 2 feet or more wide, and have four openings. The Disc pulpers, manufactured in Colombo, Ceylon, differ somewhat in principle, though they cost much the same. These have an iron disc of 1 foot or 14 inches diameter and 1 inch thick, in the place of the drum, and covered on each side, in the same way, with punched copper. The breast is replaced by moulded plates, called, in this case, "chops," which are, in the same way as the breast of the former machine, moveable, and must be regulated to suit the crop.

Both these machines have a box or hopper above the revolving disc or drum, which is for the purpose of arresting any stones or other hard substance that might, by accident, come in with the fruit, and, in passing through, tear the copper and damage the machines.

The pulped parchment coffee, in both instances, passes out into a shoot in front, from which it may be conducted anywhere, while the pulp is ejected separately behind.

It is quite possible to make a little machine, once the principle is grasped, that will so crush the berries that the seed is pressed out and can then be separated by means of a sieve. Cheap pulpers of sorts are being made, and frequently work very well for a year or two; but being generally of wood will not stand continued wear. The better machines are those described above, which are of cast iron, well fitted, turned, and lasting. They are rather expensive, however, for from £4 to £6 must be added for freight, &c., according to the distance to be transported. The smaller size or "single" pulpers being quite large enough to pulp all the crop from a 30-acre estate. For a very small place, however, I would rather advise the grower to obtain, if he can, a locally made cheap machine, or to make one for himself for the first year or so, rather than sink capital in expensive machinery. After that, not only will the coffee itself pay for the better machine, but it will be to the grower's advantage then to get one.

These pulpers can be run by hand or by power: where power, water or engine, is available it is cheaper and better, of course. This is practically the only machinery necessary for coffee culture. In drying, if the climate is such that the parchment cannot be quickly or properly cured by the sun, some method of artificial drying may have to be adopted, and some little machinery used; but I hope to deal with this in another chapter.

The mechanism of the ordinary small or single disc or breast pulper is very simple, and is easily mastered by the novice, the only difficulty being the setting—that is, the fixing, by means of the screws and bolts already mentioned, the breast or chops at such a distance from the revolving copper, that no berries shall be left unpulped, no beans pass out with the pulp and be lost, and none be cut or damaged. The exact distance will vary each season, and sometimes will have to be altered during the season.

The rules are, in Gordon's pulpers, to have the breast as close as possible to the copper without touching, the upper part is turned in such a way as to allow of the beans being automatically caught in and crushed; and with Walker's or the Disc pulpers, the lower chops set as close as possible again, but the upper set, the width of a coffee bean from the copper of the disc. A very few minutes at the machine, with a few berries by to try it, will show the best setting that can be obtained; and once this is got, the bolts are tightened up, and it is thus kept in position.

For pulping, a supply of water is an absolute necessity; this must run into the box or hopper, above the disc or drum of the pulper, with the cherry, and from there wash over with it. If no water is used, a considerable amount of the beans will get cut and damaged, and the pulp pass out with the beans instead of separately. The supply of water must be regulated too, so as to have enough passing with the beans to wash them along the shoot into the fermenting vat on the one side, and enough to wash the pulp along the back shoot to the pulp pit on the other.

The coffee berries, having been put through the pulper, are subsequently known as "Parchment" coffee, the name being derived from the parchment-like putamen or covering of the seed. As it is almost impossible to pulp so absolutely clean as to have no pulp pass over with the parchment, it is usual, in fact, the rule, to pass the parchment through a sieve of $\frac{3}{8}$ to $\frac{7}{16}$ inch gauge, and to put back into the cherry loft or hopper any pulp or imperfectly pulped berries, and allow them to pass through the machinery again. The parchment is then conducted through troughs of tin or wood into the fermenting vat. This should be of wood, as zinc or iron is cold and might also contaminate the coffee. Frequently these vats are built of brick and lined with cement or asphalt, but where wood can be got that will stand water, and can be used without fear of white ants, it is better. The vats should be three in number at least, for the fermenting process may take time and subsequent pulpings cannot be mixed with the parchment once the process has been started. A good size for these vats is $2\frac{1}{2}$ feet by $2\frac{1}{2}$ feet by 6 feet for small estates; they can be made larger if required, but it is always well to have them at least as deep as, if not deeper, than they are wide, and a long narrow vat is more handy than a deep square one. Moreover, the thicker the timber the better, and if they can be made of 2 or $2\frac{1}{2}$ inch planking, so much the better. Into one of these vats, then, the parchment coffee is allowed to run, and the water drained off through doors at one end, the parchment being heaped up at the near end.

The Fermenting Process.—It is a mistaken idea to suppose that water is necessary in the vats while fermenting; the coffee will ferment better without it, and, in fact, the water retards the process by keeping the coffee cold. The object of fermentation is to allow of the easy and complete removal of the glutinous saccharine matter that is found adhering to the parchment on its first being pulped. It will take place naturally, and in doing so will generate a considerable amount of heat, and turn from a clear, whitish colour to a dirty

brown. To assist the fermentation, it is necessary to retain as much of this heat as possible, and therefore the coffee is heaped, and also, if possible, covered up with an old sack or two in the vat, and allowed to remain so until the process is complete. In cold climates, or in cold weather, the process will take some time, sometimes as long as three days, but this is unusual, generally 24 to 36 hours are sufficient. The hotter the climate, the quicker the process. It is advisable to prevent any free play of air or draught either over or below the vats—in fact, it may be occasionally necessary to apply artificial heat to quicken the fermenting. To ascertain whether the coffee is sufficiently and properly fermented, the coverings must be removed and a handful extracted from the middle of the heap. Of this, a bean or two is chosen and washed, and then felt with dry hands (a common way is to try it on the cheek). If at all sticky, it is not yet sufficiently done; but if it comes clean and free from glutinous matter, the contents of the vat may be washed out. With very little experience, it can be judged by feel and colour, and, before long, growers will be able to tell, purely by the time it has taken, whether it will have fermented or not, though the time will naturally differ in different localities. When fermented, the coffee is turned out into the washing vat. This is a vat used purely for washing, and is therefore a shallow and water-tight one, generally much larger than the fermenting vats, and usually the width of the three fermenting vats and square, but only a foot or so deep. Only one of these is necessary, and it is arranged so that the panel doors of the fermenting vats all open into it, and the top rim on a level with, or even lower than, the bottom of the fermenting vats.

The coffee having been shovelled into this, it is spread out, and, to facilitate the washing and loosen the glutinous matter, is well trampled with bare feet. This process may be omitted, but if water is scarce, it is a saving of work as well as of water. The next thing is to three-parts fill the vat with water, and, by means of a piece of board about 14 inches by 6 inches, with a broom-handle let into it, or a blind rake, to agitate the coffee until the dirty, brown-coloured saccharine matter is in suspension in the water, which is subsequently run off by means of a small door. Immediately before the water is run off, however, the imperfectly formed beans or "floaters" which will rise to the surface of the water, on the coffee being agitated by the rake, must be skimmed off and put on one side. As a rule, *three* waters will be found necessary for washing, and the coffee must be worked up and down thoroughly by means of the rake until *quite* free from stickiness and *quite* clean. During the washing, a small quantity of unpulped beans or skins (which will have turned black) will be observed, and these, not being light enough to float, will keep with the parchment. A little practice with the rake, however, will enable the grower to wash these down towards the door and apart from the pure parchment, which is left at the other end of the washing-vat in a heap, to be removed to the drying trays, tables, or shed. The water from the washing-vats is not allowed to escape free yet, but is passed through another vat called the "tail" vat. This is a small vat some 2 feet or 3 feet square, very shallow, with a perforated bottom so small as to allow nothing the size of a coffee bean to pass; it is, in fact, merely a large sieve. This arrests the black or unpulped berries above mentioned, which are deliberately washed out, together with any beans of good parchment that may have come out with the water in any of the three washings. However carefully the water is let off from the washing-vat, a few beans will escape, but these are saved by the tail vat, and are dried separately, and designated "tail" coffee.

It must not be thought that tail coffee is therefore the worst sample; it is, in fact, frequently picked over and subsequently added to any over-ripe cherry that has been separately dealt with, or to any rat or bird coffee picked up in the parchment in the field, to form a No. 2 Parchment.

This description is for hand washing only Where water is plentiful and a fall can be obtained, washing-machines can be used with great saving of time and labour, and the whole process of washing done at one time. These machines can be readily made from a zinc or iron tank 2 or 3 feet deep; the

water is conducted into this by a pipe running to the bottom, and is discharged beneath a grating or perforated false bottom, the entire size of the tank, through which it is returned with some force through the coffee in the tank. The tank must have a tight-fitting lid, also perforated by preference, and an outlet near the top or all round the rim through which the floaters can be automatically washed away. The light coffee is generally floated off with a small flow of water, the aperture being then shut and the full force of the water turned on, only allowing the surplus water to escape from the top; subsequently a door is opened to allow the coffee to be washed out into the tail vat or direct into the perforated drying-trays. Washing-machines that have wooden paddles in them are more satisfactory than those relying entirely on the force of water, as in the latter the coffee is apt to be unevenly washed.

The outturns of parchment from cherry by measurement should be about 50 per cent., or 50 bushels per 100 pulped. It will vary a little, of course, as will the percentage of tails and light coffee, according to the season and age of trees, but there should not be more than about 2 per cent. under ordinary circumstances of tails and light together. As a rule, from 90 to 100 bushels, of dry parchment go to the ton of clean coffee, and 75 bushels in the parchment to a ton; and the measurement of wet parchment as nearly as possible tallies with its measure when dry, for though the bean itself will shrink the parchment does not to any appreciable extent. A bushel of parchment turned out of the washing-vat usually weighs between 50 and 60 lb., and it is well, where possible, to dry it down to 40 lb. or so *in the shade* before putting it into a fierce sun.

Drying.—On a cloudy day the parchment may be run out into the open air and dried there, but, if put out into bright sunlight while wet, the parchment, and frequently the bean too, will stew and bleach and the colour be lost. Frequently also the parchment will *split*, and the bean, being too soon exposed to the sun, will shrivel and dry parti-coloured instead of evenly. The special object to be aimed at in drying coffee is to obtain for the dried sample a good, smooth and unwrinkled shape, and an even blue-grey or slatey-grey colour. The coffee is to a great extent valued by its colour, and colour is a thing to be *retained* rather than *obtained* for the beans. It is best in any case to allow the water to entirely run off before putting the coffee into the sun or otherwise drying it. The sun is by far the best agent for curing the crop. Sunshine, however, is not always to be had just at the curing season, and in some places is not sufficiently strong even when available to dry the coffee in any reasonable time. Where coffee can be dried in the sun within a week or so, there is no need for artificial means, but in many places artificial means of drying will have to be resorted to, and this, being a large and intricate subject, must have a chapter to itself.

Where it takes longer than a week to dry in the sun, there is fear of splitting, burning, or browning of the parchment, and uneven drying of the bean and consequent patchy colour. The parchment will frequently split in the bags or in the storeroom *after* drying, but no harm is done thereby if the coffee be not again exposed to the sun for any lengthened time. The effect of good, bad, or indifferent fermentation will, by this time, be apparent. If insufficiently fermented, the parchment will, however dry, still remain somewhat sticky, and this is tested by grasping a handful with a perfectly dry hand and dropping it again, when, if saccharine matter is present, the heat of the hand will cause some to stick to the palm. The fear in this case is that the coffee will, on being packed and stored, become mouldy, for the sugar, though in very small quantity, still adhering to the parchment, will, like salt, absorb moisture from the atmosphere. If over-fermented, the parchment will dry brown, instead of a pale straw-colour, and, if very much over-fermented, the bean will be yellow too, and the flavour will possibly be affected. This yellowish tint of the bean is called "foxiness," and is, at first, apparent in the crack or fold of the bean, which becomes a dark yellow and almost red. Another effect of over-fermentation is the adhesion of the silver skin; this will also often happen through too sudden drying and splitting of the parchment.

The Apparatus Necessary.—For natural or sun-drying coffee, very elaborate apparatus is not necessary, though in this, as in machinery, money can be spent if desired. The method usually adopted in other countries is by means of barbecues or flat built surfaces covered with cement, asphalt, or matting. In this country, however, the erection of barbecues is difficult and expensive, and, moreover, the sun is scarcely strong enough to dry the coffee without the assistance of a free play of air beneath it. Therefore, the system of drying on tables is the more suited to the climatic conditions. These tables are easily constructed, and consist of posts of scrub timber let in about 6 feet apart, in double rows some 3 feet wide for any available length, and battens nailed lengthwise on these, on which the trays of coffee can be laid or wheeled If matting were obtainable, small scrub sticks or saplings might be laid across the table or table frames and the coffee spread out on it ; but no cheap matting seems available. I have little doubt, however, that coir or cocoanut matting, which is most generally used, could be imported at far less cost than the material at present in use. Trays have the advantage of being more easily handled when labour is scarce, and these may be made of perforated zinc of small-sized perforations; a tray 5 feet by 2½ or 3 feet being a handy size, with a rim of wood, 3 inches or so high, all round. For more perfect drying and better lasting, galvanised woven wire is better, but costs about twice as much as the perforated zinc. Either of the latter are better than cloth or hessian, as trays of this material absorb so much moisture that they have to be frequently changed and separately dried.

A labour-saving arrangement is to have small wooden wheels on the trays, on which they can be run out and quickly returned if desired, or, if not possible to have wheels on each, to have a light trolly of wood that any handy man can run up for himself, on which the trays can be put, and wheeled out and in. On large estates this system is frequently adopted, and large trays, 6 or 8 feet square, are run out on iron rails, and the rails so laid that the trays stand one above the other, and occupy very little space in the shed when run back at night or during showers. This, however, is expensive, and light trays and wooden rails are handier for small estates in this country.

Testing Drying.—The ordinary rough-and-ready method of testing the dryness of the coffee is to see whether any indentation can be made by the finger-nail on the bean. If hard enough to resist this, it is considered sufficiently dry to store or despatch; but for hulling, this is not dry enough, and the coffee must be again dried until it will break without bending between the teeth.

Packing.—The coffee should be thoroughly dried before being stored, and, if possible, dried again immediately before being bagged. Thirty to thirty-five pounds should be the average weight of a bushel dry, and this will give 25 to 29 lb. of cleaned or "rice" coffee.

As stated earlier, the weight of coffee will vary very much on the estate as well as between different estates, so that judging by weight can only be practised after the dryness is otherwise proved. Coffee from a young estate will not give as good weight to the measure as that from older trees, and frequently the bushel may only weigh 25 to 30 lb., when thoroughly dry, in the parchment, and only yield 20 to 25 lb. of clean coffee.

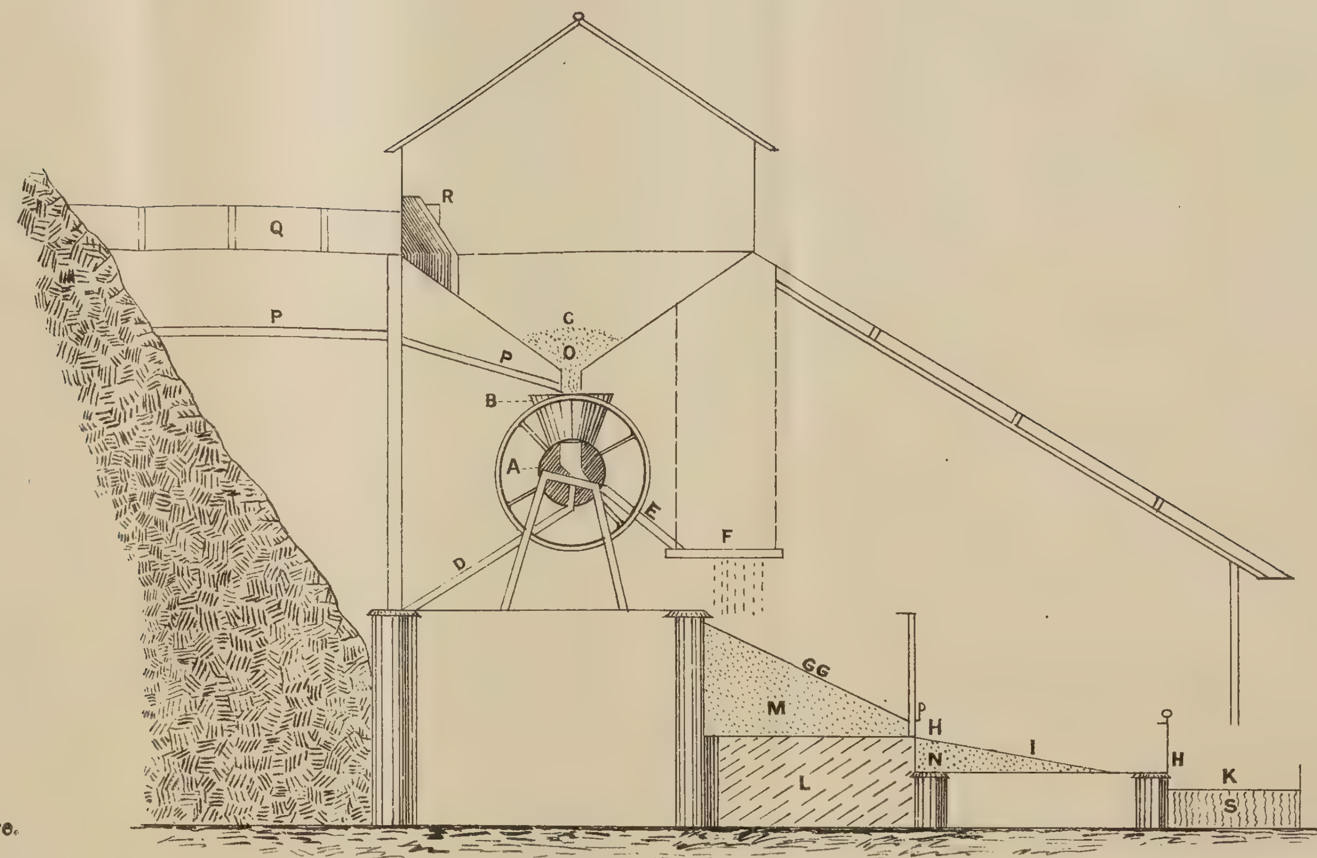
Be careful that the bags are clean and dry, and weigh or measure carefully before despatching. Coffee will always vary a little in both weight and measurement between despatch and its arrival at its destination by the breaking of the parchment or swelling from dampness. Bags that have previously held sugar or salt will induce dampness, and, if previously filled with any matter having a strong smell or taste, may taint the coffee. If for a sea voyage, it is best to use double bags and to sew up securely, for sea water, or even sea air, will quickly spoil a good sample.

Before being hulled, coffee should be thoroughly dried again, especially after a journey, whether by sea or land. The process of hulling I shall, however, deal with later.

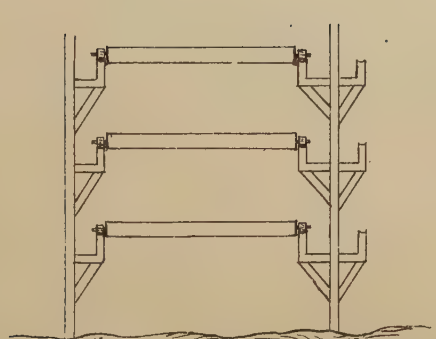
Plate IV.

EXPLANATION.

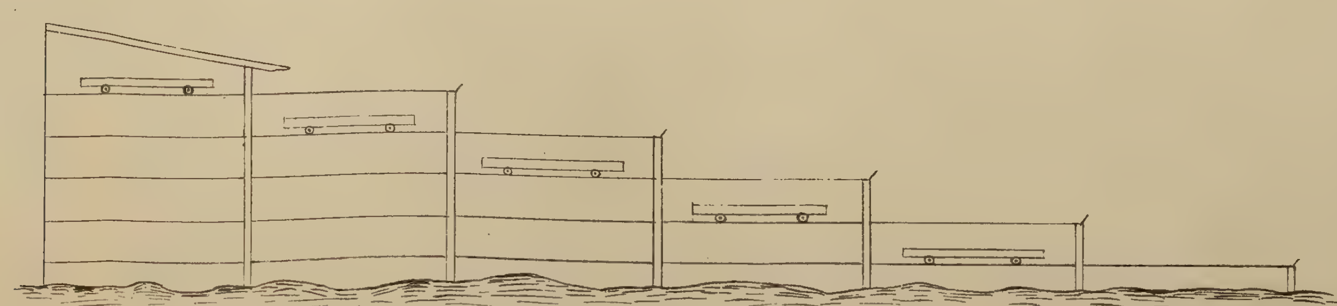
A—Disc or Drum of Pulper.
B—Hopper.
C—Cherry vat
D—Pulp shoot
E—Parchment shoot
F—Sieve.
GG—Fermenting vats
HH—Sliding doors
I—Washing vats.
K—"Tail" vats.
L—Space under fermenting vat, to be enclosed.
M—Coffee in fermenting vat
N—Coffee in washing vat.
O—Cherry in Cherry vat
PP—Water pipes.
Q—Bridge to Cherry loft, or vat.
R—Automatic bushel measure.
S—Final escape of water.



Coffee Pulping House.

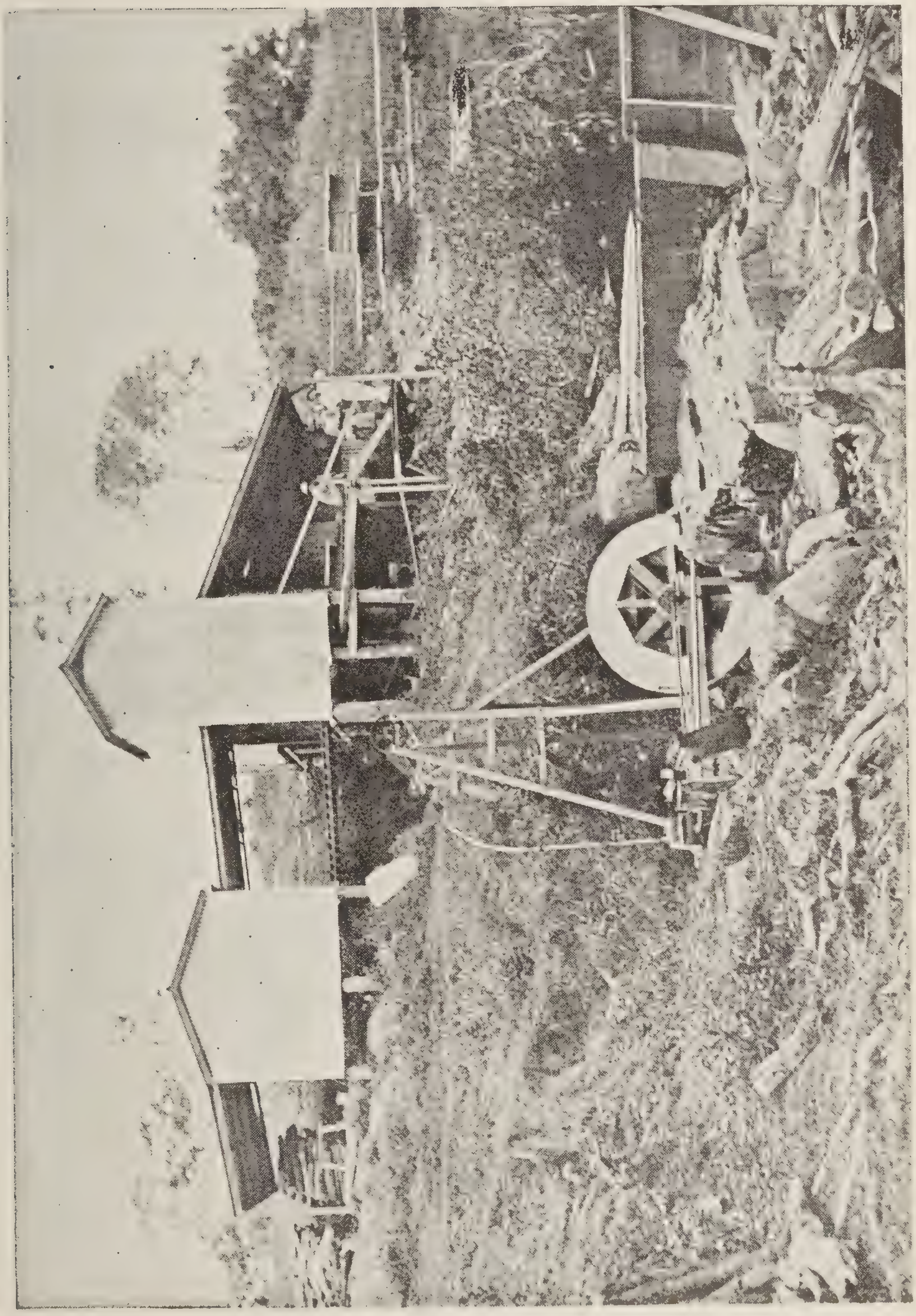


End View



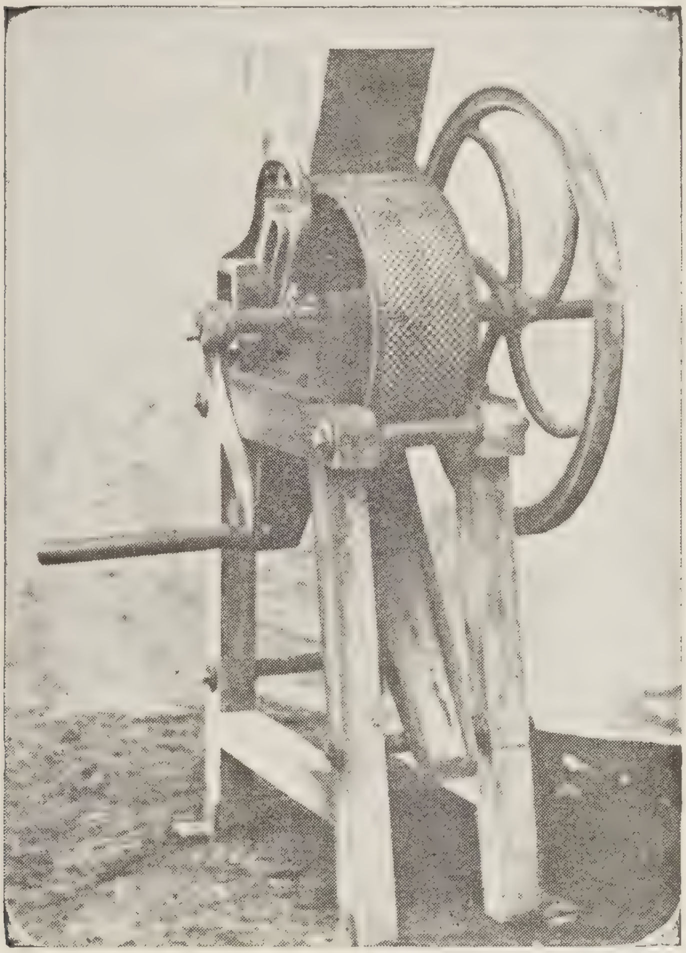
Drying Apparatus—Trays on Wheels.

Plate V.



W. A. HANNAM'S PULPING HOUSE MYOLA.

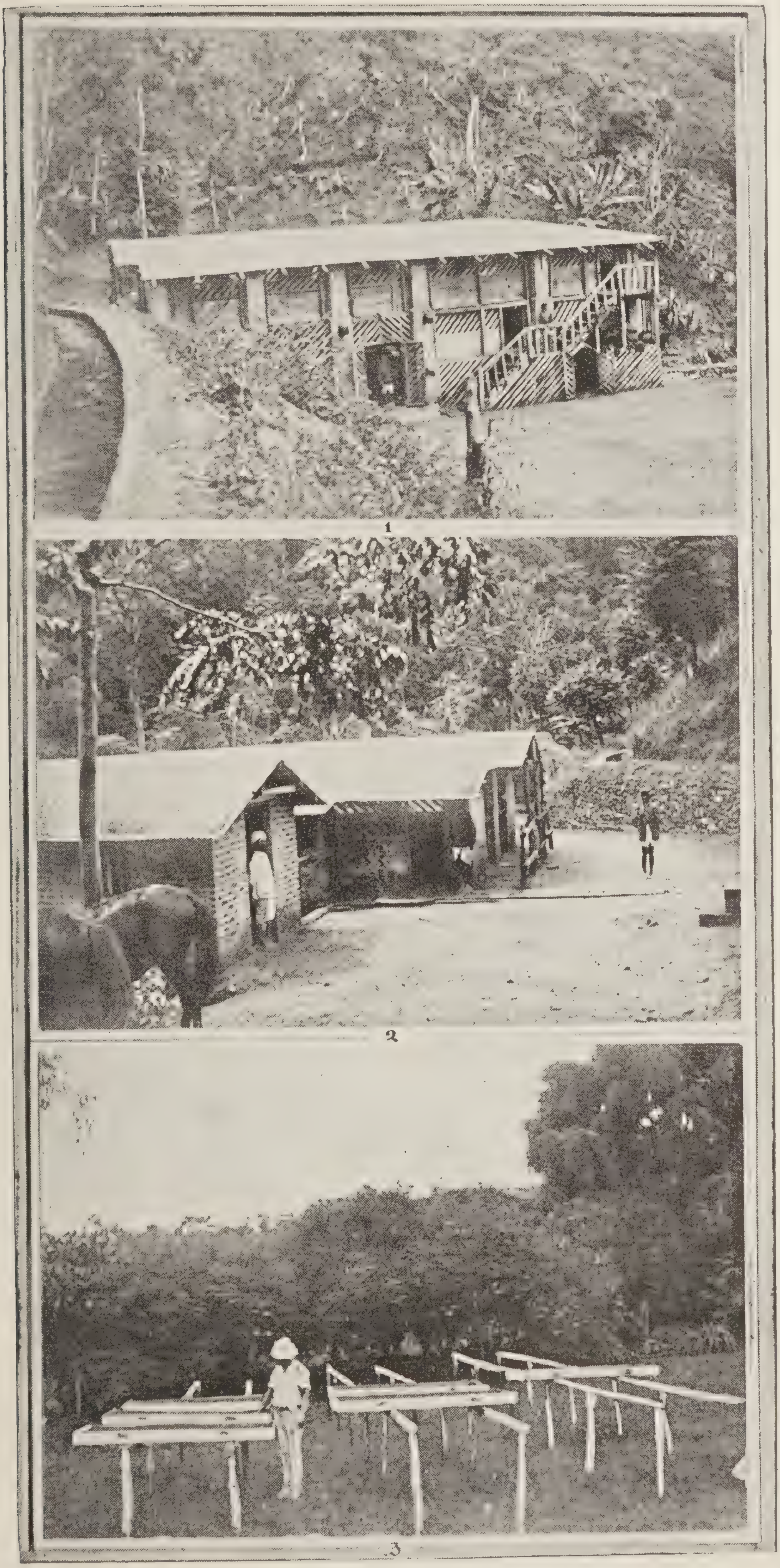
Plate VI.



BREAST PULPER.

INTERIOR OF W. A. HANNAM'S PULPING-HOUSE.

Plate VII.



1. Pulping-House, Pillarely, Ceylon (worked by a 20 ft. Water Wheel).
2. Entrance to Cherry Loft.
3. Drying Trays without Wheels.

SUGAR EXPERIMENT STATION, MACKAY.

REPORT ON CROPS FOR MONTH ENDING 31ST MAY, 1900.

Name of Crop.		Planted.	Area.	Drilled or Broadcast.	Manure Applied. Name.	Manure Applied. Per Acre.	Rainfall during Month.	Treatment during Month.	Growth during Month.	Date of Harvesting.	Quantity Harvested per Acre.	Total Quantity Harvested.	Remarks.
			Acr's			cwt.					tons		
Sorghum	A2	27-9-99	·27	Drilled	Standard phosphate Potash sulph.	2 1	3·377	Seed collected from this	...	...	..	...	Upper portion of stalks will be used as feed. Rest will be ploughed out.
Sorghum	A2	28-4-00	·20	,,	None ...	...	...	Scarified	Slow, but healthy.				
Cow Pea	A3	28-9-00	1·23	,,	,, ...	...	...	...	...	...	...	...	Being used up as horse feed.
Small Mauritius Bean ...	A3	1-11-99	·05	,,	,, ...	...	...	..	Very little	...	...	...	Tried to compare its growth against velvet bean in this block.
Velvet Bean	A4	1-11-99	1·89	,,	,, ...	...	...	...	Good growth	...	...	...	No seed available yet. Seed crop just coming on.
Small Mauritius Bean ...	B1	21-11-99	·59	,,	,, ...	...	...	...	,, ,, ...	...	...	...	In flower and seed forming.
Field Pea	B1	21-11-99	·26	,,	,, ...	...	...	...	...	...	...	...	Ploughed under.
Narico Bean	B1	21-11-99	·39	,,	,, ...	...	...	...	...	...	...	...	Ploughed under.
Small Mauritius Bean ...	B2[1]	16-9-99	·08	,,	Standard phosphate Potash sulph.	2 1	...	...	Good ...	...	...	...	Good crop; seed formed.
Velvet Bean	B2[1]	16-9-99	·38	,,	,, ,, ..	...	...	...	...	...	...	..	Good crop but leaves now badly eaten by a Halticides.
Black Mauritius Bean ...	B2[1]	16-9-99	·01	,,	,, ,, ...	...	...	...	...	...	...	...	Very good crop; seed maturing.
Cow Pea	B2[2]	18-9-99	·39	,,	None ...	...	...	...	...	...	...	...	Ploughed under.
Small Mauritius Bean ...	B2[2]	18-9-99	·31	,,	,, ...	...	...	...	Good ...	...	...	...	Flowering, seed forming and maturing.
Cow Pea	B4	23-2-00	·40	,,	,, ...	...	...	Scarify & weed	Very little.				
Velvet Bean	B5	4-11-99	2·24	,,	,, ...	...	...	...	Good ...	...	...	...	Collecting ripe seed from this.* Vine flowering and other seed pods forming.
Narico Bean	C0[1] 1	22-11-99	·41	,,	,, ...	...	...	...	...	...	...	...	Ploughed in.
Small Mauritius Bean ...	C2 3 4	14-11-99	1·36	,,	,, ...	...	...	...	...	...	...	...	In flower, but very few pods formed.
Cow Pea	Outside	25-4-00	·75	,,	,, ...	...	...	Scarify & weed	Fair.				
Grape Vines	Four rows	,,	...	...	...	...	...	Scarify & weed	...	...	...	...	Canes ripening.
Thirteen Orange Trees ...	...	,,	...	...	...	...	...	...	...	...	...	...	Very good fruit.
Cane	B0	,,	1·10	...	...	...	...	Trash & examine	Fair.				
Cane	Laboratory P	,,	...	...	...	...	...		Good.				
Pineapples	B0	,,	·20	...	...	...	...	Scarify	Very good.				

* Difficulty is being experienced in shelling the velvet bean, owing to the leathery nature of the pod, even when perfectly air-dried.

REPORT ON EXPERIMENTS FOR MONTH OF MAY, 1900.

Purpose of Experiment.	Name of Crop Operated upon.	Area.	Planted.	Drilled or Broadcast.	Manure Applied.	Method of Application.	Treatment during Month.	Rainfall during Month.	Growth during Month; with Details of Results of Experiments.
		sq. yds.							
To determine behaviour, growth, yield, and get analyses of these as green manures	Sport Blk. Maur. B.	2	8 3-00	Broadcast	None	...	Weeded ...	3 377	Very good. Crop very dense, entirely covering plot.
	Poor Man's Bean...	2	,,						Completely covers ground, but not nearly so dense as No. 1 or 4.
	Narico Bean ...	2	,,						Very fair crop, not quite covering ground. In flower now.
	Small Maurit. B. ...	2	,,						Very good crop, low growth, but completely covering ground.
	Madagascar B. ...	2	,,						Crop a failure, only two plants growing.
	White's Perennial Cow Pea	2	,,						Doing very well, completely covering ground.
	Velvet Bean ...	2	,,						Not yet covering ground, growth slow, but vines very deep, green, and healthy.
	Blk. Cow Pea ...	2	,,						No growth of vine, but abundance of seeds.
For vines, roots, &c.	Sport Blk. Maur. B.	2	5-3-00	These all planted in 6 in. tiles	None	.	Weeded and watered	...	Fair.
	Poor Man's Bean...	2	,,						,,
	Narico Bean ...	2	,,						,,
	Small Maurit. B. ...	2	,,						,,
	Madagascar B. ...	2	,,						Only one plant growing.
	White's Perennial Cow Pea	2	,,						Fair.
	Velvet Bean ...	2	,,						Fair, slow growth.
	Blk. Cow Pea ...	2	,,						No good.
Various ...	Cane	...	...	In boxes of sand	As already detailed	..	Trashed ...	...	Fair. On 14th May this had 19 canes; total length of cane, 322½ in.; average length of cane, 17·0.
	,, ...	...	...						Good. On 14th May this had 9 canes; total length of cane, 294 in.; average length of cane, 32·7.
	,, ...	...	...						Little. On 14th May this had 7 canes; total length of cane, 200½ in.; average length of cane, 28·6.
	,, ...	...	...						Little. On 14th May this had 6 canes; total length of cane, 49 in.; average length of cane, 8·2.
									NOTE.—The value of above figures is enhanced when it is understood that the canes in No. 2 are thicker and better than in Nos. 1 and 3. So far as one can judge, there seems a greater weight of cane on No. 2 than No. 1.

REPORT ON EXPERIMENTS FOR MONTH OF MAY, 1900—*continued.*

Purpose of Experiment.	Name of Crop Operated upon.	Area.	Planted.	Drilled or Broadcast.	Manure Applied.	Remarks.
		sq. yds.			At the rate of per acre.	
Second Series of Experiments.	Cane, var. "Striped Singapore."	...	25-4-00	3 single eyes in each box	400 lb. lime as sulphate, 1,200 lb. potash as sulphate, 200 lb. phosphoric acid as sodium phosphate, 450 lb. nitrogen—half as ammoniacal, half as nitrate	Cane all up in four days, and no misses.
					400 lb. lime as sulphate, 1,200 lb. potash as sulphate	
					400 lb. lime as sulphate, 200 lb. phosphoric acid	
					400 lb. lime as sulphate, 450 lb. nitrogen—as half nitrate, half ammoniacal	
					400 lb. lime as sulphate, 450 lb. nitrogen as ammonium sulphate	
					None	
					Blank experiment ...	

FERTILISING SUGAR-CANE.

Not only in Queensland has it been found necessary to assist the cane-farmers to increase the weight of cane per acre. Other, and much older, sugar-producing countries are having their eyes opened to the fact that their methods of cane-growing are obsolete. Yet one would have thought that with so many years of experience they should have nothing to learn.

Dr. Stubbs, of Audubon Park, Louisiana, has for the past ten years been making most exhaustive and comprehensive experiments covering every phase of the subject. The results of his work are now being published in the *Louisiana Planter*, and they are well worthy of being carefully studied by all cane-growers in Queensland. The *Planter* says:—It is unfortunate that such enormous sums of money are annually expended for fertilisers without any adequate knowledge as to the results produced or that may be fairly expected. The critical experimentation at Audubon, the results of which are now given (in the *Planter*), will save the useless outlay of thousands of dollars to the sugar-planters of Louisiana. At the same time, while preventing useless outlay, the conclusions reached by Dr. Stubbs prove beyond any doubt the great necessity for fertilising our cane lands, and the profitable results that may be expected therefrom.

Here is precisely the work which Dr. Maxwell will be able to do for the Queensland cane-growers, and if, by his advice, the latter are enabled to produce, say, 24 tons of cane per acre instead of 16 tons, then Dr. Maxwell's services cannot be rated too highly. A ton of sugar can be made from 8 tons of cane of fair density. The increase in weight of produce, if it is achieved, as we have very little doubt it will be, when science and experience are brought into the field, will thus give an extra ton of sugar to every acre cut. It will yield the grower from £4 to £6 per acre more than he now obtains.

Let us take the Ayr district as an example. In 1899 the area of cane crushed locally was 4,845 acres. The weight of cane produced on that area was 67,152 tons. The yield of sugar was 1·35 tons per acre. The average weight of cane per acre was 13·86 tons; and it required 10·30 tons of cane to make 1 ton of sugar. Had the land produced 24 tons per acre, the weight of

cane on the whole area crushed would have almost reached 115,152 tons. At only 10s. per ton, this would have given the growers £57,576, instead of £33,576—£24,000 presented to one district alone!

Over the whole colony, 79,435 acres were crushed for cane in 1899. The weight of the cane produced was 1,176,466 tons, giving an average of 14·81 tons per acre. If cane-growers can succeed by superior methods of cultivation in raising the average to 24 tons per acre, the minimum would, roughly, amount to 714,000 tons, of a value, at 10s. per ton, of £357,000. The value of the extra ton of sugar on the whole area would, at £8 per ton, reach £735,480.

Yet, in the face of our decreased output of cane, we export our manures, instead of applying them to our own lands. From the Registrar-General's report for 1899 we learn that we exported 9,915 tons of bonedust and manure produced by meatworks (which turned out 20,000 tons)—one-half of a product sent out of the colony, whilst the sugar lands are crying loudly for it, and are yearly decreasing in fertility. Besides this, we exported 6,177 tons of guano. Altogether, we sent away manures to the value of over £54,000, the use of which would have returned far more in the increased production of cane.

The Queensland farmer cares little to trouble himself about manuring his land. He has been so accustomed to obtaining heavy crops from the rich scrub soils and black and red soils of the plains that he hardly notices the annual steady decrease in his crops, and sets the failure down to the weather and the grubs. The last thing he thinks of is the gradual withdrawal of the fertilising ingredients in the soil Now, let us hope that the importance of restoring the fertility of the soil will be brought home to him, and when Dr. Maxwell has succeeded in his great work the colony will be his debtor.

Now let us consider what a cane crop takes from the soil. Dr. Stubbs tells us that 40 tons of cane, with its accompanying foliage, will remove about 120 lb. of nitrogen. 42 lb. of phosphoric acid, and 50 lb. of potash. A crop of cow peas, if turned under, will restore at least 100 lb. of nitrogen per acre if a good crop is secured. (We again quote from the *Louisiana Planter*.)

A study of the data conveys some idea of the exhaustion taking place in every soil—first, where the triennial rotation is observed with corn stalks and pea vines turned under; second, where the same rotation is observed, but with corn stalks and pea vines removed for hay; and third, succession cane with and without pea vines.

Taking the first, the average crop of plant cane in this State is not far from 25 tons per acre, and the succeeding first year stubble 15 tons. The crop of corn following the stubble is about 25 bushels per acre. The cow-pea crop with the corn will furnish about 100 lb. nitrogen per acre. If the corn stalks with the cow peas be turned under, they will add a large quantity of humus to the soil, besides its one hundred and odd pounds of nitrogen. If the custom prevailed of returning the manure from the stables to the fields, *which should exist on every plantation*, then the utilisation of the pea vines and stalks for hay would be the rational method of procedure, and no loss of fertility could be chargeable to the plantation by such removal. Unfortunately, little or no care is taken either to preserve the manure or to restore it to the fields, on many places, and hence the crops consumed on the plantations are really so much soil fertility removed.

The 40 tons of cane, with its accompanying foliage, if the latter is burnt on the soil, will remove about 120 lb. nitrogen, 42 lb. phosphoric acid, and 50 lb. potash. The corn crop, with its stalks, will remove about 40 lb. nitrogen, 15 lb. phosphoric acid, and 32 lb. potash. The cow peas, if turned under, will restore at least 100 lb. nitrogen per acre if a good crop is secured. In the triennial rotation existing in Louisiana, where the pea vines and stalks are turned under, there would be consumed 170 lb. nitrogen, 57 lb. phosphoric acid, and 82 lb. potash. Against this should be credited 106 lb. nitrogen for the pea vines, and 20 lb. nitrogen, 5 lb. phosphoric acid, and 28 lb. potash for the corn stover returned to the soil, leaving to be supplied in the fertiliser 50 lb. nitrogen, 52 lb. phosphoric acid, and 54 lb. potash. These ingredients,

neglecting the potash which our soils supply abundantly, are furnished in a little over 700 lb. cotton-seed meal and 400 lb. acid phosphate. Therefore, an annual application of 350 to 450 lb. cotton-seed meal and 200 lb. acid phosphate will meet the annual average draft upon the soil.

If, on the other hand, the pea vines and corn stalks are removed, the draft upon the soil will be much greater. The pea vines will not only carry from the soil the nitrogen which they have gathered largely from the air, but also the phosphoric acid and potash they have taken directly from the soil. The corn stalks, with fodder, will also be removed.

The account will then stand as follows: 170 lb. nitrogen, 57 lb. phosphoric acid, and 82 lb. potash for the corn and cane crops, plus the amount of mineral matter carried off by the pea vines. It is estimated that from one-sixth to one-fifth of the fertilising ingredients of a pea crop is left behind in the roots and stubble when the vines are removed for feed. Taking one-fifth as the average, which by our methods of gathering is probably excessive, there will be removed in the vines 80 lb. nitrogen, 22 lb. phosphoric acid, and 67 lb. potash. Adding this mineral matter, which was gathered from the soil, to the above, there will be obtained 170 lb. nitrogen, 79 lb. phosphoric acid, and 149 lb. potash, which must be credited by the 20 lb. of nitrogen left in the roots and stubble of the pea crop, presumably taken from the air. There will remain, therefore, 150 lb. nitrogen, 79 lb. phosphoric acid, and 139 lb. potash to be supplied by the fertiliser. Neglecting the potash and using again cotton-seed meal and acid phosphate to supply these ingredients, there will be required about 2,100 lb. of cotton-seed meal and nearly 600 lb. of acid phosphate for each acre in the rotation. An annual application of 1,050 lb. of cotton-seed meal and 300 lb. of acid phosphate to each crop of cane would be required to keep up the fertility of the soil, amounts which our short seasons will not usually permit of assimilation. It will thus be seen that for the maintenance of the fertility of our soils, it will be necessary to turn under our pea vines, or also scrupulously preserve and carefully return the manure which has been made by the consumption of the pea-vine and corn crops.

With *succession* cane, the draft is still heavier. If it be assumed that an average of 20 tons of cane will be taken from each acre cultivated, this will remove annually 60 lb. nitrogen, 21 lb. phosphoric acid, and 25 lb. potash (presuming the trash be burnt regularly each year).

Using again cotton-seed meal and acid phosphate, and assuming that our soils have an abundance of available potash for many years to come, there will be required annually a mixture of 857 lb. cotton-seed meal and 150 lb. acid phosphate. In the above no account has been taken of the phosphoric acid in cotton-seed meal. If this be taken into consideration, which ought to be done, since experiments have shown it to be readily available, then the 857 lb. cotton-seed meal alone will supply both the nitrogen and phosphoric acid required in succession cane. In the other two instances cited, the phosphoric acid in the meal used should properly be deducted from that required in the acid phosphate. If a good crop of cow peas be grown every third year in the succession cane and turned under, a credit can be given of about 100 lb. nitrogen per acre for this crop, but the cane crop in which the pea vines are grown will rarely reach 20 tons per acre.

Cotton-seed meal has been used above simply to illustrate in tangible forms and quantities the nitrogen required.

If dried blood or tankage be used, its content of nitrogen should be determined, and then an easy substitution can be made for the cotton-seed meal. Both dried blood and tankage are variable in composition, and in purchasing either it would be more economical, provided they are sold by the unit at the factory, to procure those containing the highest content of nitrogen.

FILTER-PRESS CAKE.

Each ton of cane worked in a sugar-house will give about 25 lb. filter-press cake. Therefore, 40 tons will give 1,000 lb., containing about 7 lb. nitrogen

and 5 lb. phosphoric acid. If this be carefully returned to the soil, it will restore the nitrogen contained in 100 lb. cotton-seed meal. Average filter-press cake is worth, according to the tariff of prices prevailing for commercial fertilisers, 1·75 dollars to 2·00 dollars per ton.

By a simple calculation, any farmer or planter can easily determine the quantity of fertilisers requisite for each acre, when the tonnage of cane removed is given.

Sugar-cane is a gigantic grass, and it is well known to every botanist that grasses require enormous quantities of nitrogen for their best development. They must all be supplied also with an abundance of moisture in the soil for the largest growth.

Chemistry, by analysis, determines the same fact, that nitrogen is the dominant ingredient in all fertilisers for cane. Hence a fertiliser with an excess of nitrogen, together with a goodly quantity of phosphoric acid, is deemed best for the average soil of our sugar district.

In these experiments the mixture of 48 lb. nitrogen as sulphate of ammonia, and 50 lb. of potash as sulphate, is styled "Basal Mixture." Experience having demonstrated that the sulphates of ammonia and potash were the best forms for cane, they have been used throughout the tests.

In the use of phosphatic fertilisers, 250 and 500 lb. of dissolved bone black and acid phosphates, each containing about 15 per cent. available phosphoric acid, have been used, representing 36 and 72 lb. of phosphoric acid per acre. With the other forms of phosphates, an equal quantity of each, 500 lb., has been used, regardless of the percentage of phosphoric acid present. This was done with a view to determine the comparative values of these fertilisers (1) with themselves, and (2) with the soluble forms. The bones used contained a small quantity of nitrogen. The other forms were practically free of this substance.

Arranging the results, so as to obtain replies to the questions propounded, we have :—

	Tons.
The average of unfertilised experiments	25·24
The average of basal mixtures	28·34
The average of soluble phosphates alone...	28·00
The average of insoluble phosphates alone	27·10
The average of soluble phosphates, 1 ration and basal mixture	29·23
The average of soluble phosphates, 2 rations and basal mixture	29·84
The average of insoluble phosphates, 2 rations and basal mixture	28·66

It is evident from the above that phosphates alone have increased the tonnage, and when combined with basal mixture have given the largest results. A further comparison of the one ration with the two rations (both combined with basal mixture) shows very little gain for the latter. Indeed, not more than will frequently occur between adjoining plats fertilised just alike. It may almost be positively asserted that one ration of phosphoric acid, 36 lb. per acre, in an available form, is an abundant quantity of this ingredient in any fertiliser for cane.

What form of phosphoric acid is best adapted to sugar-cane, comparing the soluble and insoluble forms, is answered most positively in favour of the former, but when the individual forms are compared, it would seem that both slagmeal and floats, applied continuously on same soil for many years, would ultimately furnish abundantly all the phosphoric acid needed by cane. Each year then its efficiency becomes more and more apparent. Similar but diminished results are

visible in the continued use of the other insoluble forms. Here is the comparison:—

	Tons.
Average of the dissolved bone black (alone) experiments ...	29·88
Average of the acid phosphate (alone) experiments	26·12
Average of dissolved bone black (1 and 2 rations) with basal mixture experiments	29·52
Average of acid phosphate (1 and 2 rations) with basal mixture experiments	29·55
Average of bone black alone	27·26
Average of slagmeal alone	27·68
Average of floats alone	26·76
Average of ground bones alone	26·73
Average of bone black and basal mixture	27·59
Average of slagmeal and basal mixture	30·44
Average of floats and basal mixture	29·19
Average of ground bones and basal mixture	27·44

These experiments show that small quantities of phosphoric acid have been beneficial to tonnage. How much of this action is direct and how much indirect is as yet undeterminable. If a calculation be made it would show that even the one ration of phosphoric acid (36 lb. per acre) was an abundance for the wants of the crops.

It may be asserted, therefore, that our soils need phosphoric acid to grow cane, but limited quantities (from 200 to 300 lb. acid phosphate per acre) will suffice for good average crops.

In regard to potash experiments, kainit seems to have given best results. The conclusion drawn from the results obtained is that potash is not needed by these soils to grow cane. It is further corroborated by many other successful experiments of the station, where only nitrogen and phosphoric acid entered into the fertilisers used.

SUGAR CONTENT.

No attention has been paid to the sugar content in tabulating the results of the experiments just discussed, because, regardless of fertilisers there has been a slight increase in sugar content on all of these plats, as the experiments extended westward from the canal, due to slight but gradual change in the character of the soil.

Whatever differences may occur between adjoining plats are assignable to differences in tonnage rather than to the effect of the fertiliser *per se* upon sugar content.

The experiments of this station and a close observation throughout the State confirm the opinions and experiences of other experimenters with sugar-cane, viz.:—That there are no known fertilisers which will increase the sugar content.

It is known that excessive quantities of nitrogenous fertilisers reduce the percentage of sugar and lower the purity co-efficient, since they produce canes more immature than others less bountifully supplied with this ingredient. Where the cane has a long season of growth, as in tropical countries, even heavy doses of nitrogen may be favourable. In the tropics only the *late and heavy* manuring with this ingredient works unfavourably. In Louisiana, with short and uncertain seasons, where frequently prolonged droughts and heavy rainfalls alternate, seriously retarding or vigorously pushing the cane, the use of heavy doses of nitrogen, particularly when applied late in the spring, is apt to give in the fall immature cane, low in sugar. All nitrogenous manures should be applied early in the growth of the cane, and only in such quantities as the average season will permit of appropriation. Our experiments indicate that 48 lb. per acre is the maximum amount that can be appropriated in an *average* season. Neither potash nor phosphoric acid have influence *per se* upon the saccharine content of cane, but, being present in ample quantity with nitrogenous manures, cause a more rapid growth and quicker maturity. To this extent must they be supplied to every soil which *needs* them.

The application of large quantities of phosphatic manures to the soil has little influence upon either the growth of the cane or on the amount of phosphoric acid in the juice. Potash is, however, taken up by the cane in very variable quantities, as is shown by the analyses of Mr. Glenk and others, and how much the potash supply in the soil can be reduced before it becomes deleterious to the plant is not yet known. It is, therefore, wise to avoid heavy doses of potash in manures for cane. The nitrogen content of the juice, as a rule, rises with the addition of nitrogen in the manures, but it is not always the case that an insufficiency of growth is due to an absence of nitrogen, since frequently the want of tilth is mainly the cause.

APPLICATIONS OF FERTILISERS.

Whatever fertiliser may be required by the cane and soil, it should be applied with great care. Putting it in large continuous rolls on each side of the cane is far from being economical. It should be scattered and mixed with the soil as completely as possible to effect the greatest good. It may be placed under the plant cane at planting (particularly spring plant), or on either side after a stand is obtained, and before returning the soil. In applying it to plant or stubble just before returning the soil, it should be scattered on both sides, and, if possible, across the narrow bed of cane. In throwing the dirt to the cane after the fertiliser is distributed, it would be well to use a small plough for the first furrow on either side, and throw the dirt over the narrow ridge, covering lightly the fertiliser.

Shall all the fertilisers be applied at once, or shall they be distributed throughout the cultivating season?

It is well known that neither phosphatic nor potassic fertilisers suffer to any appreciable extent from leaching.

Nitrogen is the fugitive element of fertilisers. It suffers greatly from leaching, particularly in an open porous soil. Hence the use of nitrate of soda, the most soluble form of nitrogen, is attended, more or less, with loss on every soil. It must, therefore, be handled with great care. Applied as a top dressing in limited quantities at short intervals, it is quite efficacious in some countries. Next in solubility to nitrate of soda is sulphate of ammonia; but it does not suffer so heavily from leaching. It is particularly adapted to clayey soils.

[From the above it will be seen that a very largely increased tonnage per acre is quite within the bounds of possibility, and it will only lie with the cane-growers themselves to come into line with the suggestions of Dr. Maxwell, whose work has gone far beyond the experimental stage, the sugar-planters of Honolulu having put his work to the proof with great advantage to the sugar industry of the Sandwich Islands.—Ed. *Q.A.J.*]

THE CULTIVATION OF YAMS.

The *Ceylon Tropical Agriculturist* deplores the fact that the cultivation of yams is not sufficiently carried on in Ceylon, and that the product is not sufficiently made use of for food purposes. We can echo this complaint for Queensland. Yams are grown in large quantities in the Northern sugar districts, and also at the Penal Establishment at St. Helena, where they thrive admirably. We grew a small quantity of yams last season, and, incredible as it may appear, some of the produce and fruit merchants of Brisbane knew nothing about yams as an article of food. Now, a well-cooked yam is far superior to a sweet potato. Boiled or cut in slices and fried, it forms a very excellent adjunct to the breakfast table. The West Indians appreciate the yam more than any other vegetable of its kind, and if it were only properly introduced in the South of Queensland it would soon assert its excellence. In the hope that the tuber may soon take its proper place in the vegetable market here, we reproduce from the *Tropical Agriculturist* an account by Dr. Alford Nicholls as containing

many valuable hints which should prove useful to local cultivators. We may state that the yam vines form a most excellent shade if trained on trellises, and have a graceful appearance :—

Yams are the esculent tubers of several species of *Dioscorea* that have been cultivated in warm countries for ages. More nutritious than the common potato, they supply an abundance of wholesome food to the inhabitants of tropical and sub-tropical regions; and, in the West Indies, they enter very largely into the diet of all classes of the population.

Most of the cultivated varieties of yams are probably natives of tropical Asia, that have been introduced into the West Indies at an early period of their colonisation by Europeans, and now become almost wild. The only yam of good flavour and food value, that naturally belongs to the flora of the West Indies, is the "wawwaw" of Dominica (*Rajania pleioneura*), which grows abundantly in the forests of that island. It is dug up by the woodmen and sold in the markets of the chief town, for it is deservedly held in much estimation. After the hurricane of 1883, when most of the provision grounds in Dominica were laid waste, many of the country people subsisted for weeks almost entirely on wawwaws, dug up in the forests. All the yams are the produce of plants with slender twining stems, measuring often as much as 20 feet in height, and bearing underground tubers which spring from the principal roots. The tubers vary in size and weight from the small cush-cush, no larger than an ordinary potato, to the enormous yam weighing 30 or 40 lb., and measuring 3 feet in length. There is confusion in regard to the names and characters of the different yams, each country appearing to have its own nomenclature. There are four kinds of yams, however, commonly cultivated in the West Indies, and the most noticeable particulars concerning them are as follow :—

White Yam (*Dioscorea alata*).—This is sometimes called the Barbados yam, and it is a native of the Moluccas and Java. The stem is square and winged at each angle. The leaves are large, heart-shaped, and opposite on the stem. A peculiarity of this plant is that bulbils or small yams are borne on the stem, and when they are ripe they fall to the ground and reproduce the species. The tubers are large, weighing from 8 to 10 lb. when grown in good soil. There are two principal kinds, the white and the red, the surface of the latter is of a deep purplish, and the interior of the tuber of a light purplish colour. A third kind, called the water yam, is characterised by the interior of the tuber being of a moist and clammy nature. These yams will keep well out of the ground, and they are much liked on account of their digestibility and their superior flavour.

Negro Yam (*Dioscorea sativa*).—This is sometimes called the yellow, creole, or common yam, and it is a native of Java and the Philippine Islands. The stem, which grows to a length of 15 or 20 feet, is round, prickly below and smooth above. The leaves are heart-shaped and alternate on the stem. The tubers grow to a large size, weighing usually about 10 lb.; they are palmated in shape, and they are so brittle as to be easily broken. They are of a white or yellowish colour within, but the white kind is liked best. These yams do not keep in good condition for any length of time after their removal from the ground.

Guinea Yam (*Dioscorea aculeata*).—In Jamaica this is sometimes called the Afou yam. It is largely cultivated throughout the West Indies, but its native country is Cochin China, and it comes also from Malabar. The stem is round, prickly, and much branched. The leaves are broadly heart-shaped, and either alternate or opposite on the stem. The tubers are very large, reaching a length of 2 or 3 feet, a diameter of 6 or 8 inches, and a weight of from 15 to 20 lb. The interior is of a white or yellow colour, and when cooked the flavour is somewhat bitter.

Cush-cush Yam (*Dioscorea triphylla*).—In Jamaica this is sometimes called the Indian yam; and in Guiana it is known as the Buck yam. The stem is roundish, the leaves are opposite on the stem and divided into three leaflets.

The tubers are roundish—indeed, something like a potato in shape. They rarely exceed 9 inches in length and 3 inches in diameter, but they are usually much smaller. It is said to be the smallest and most delicate of all the yams. The plant is prolific, sometimes bearing a dozen tubers on the roots. There are two principal kinds, the white and red, the latter bearing tubers that are purplish within.

SOIL AND CLIMATE.—All the yams require a rich sandy loam, deep and friable, for the rich tubers will not be able to develop properly in stiff heavy soils. The white yam, however, will grow well on calcareous soils of moderate depth. Good drainage is necessary, and this applies to most plants bearing underground tubers. The climate must be warm, but not necessarily hot, as the plant thrives in the mountains and in extra-tropical regions One authority states that yams will grow within a wide zone extending 30 degrees north and south of the equator.

CULTIVATION.—Most of the yams are propagated in the following way:—When the tubers are ready to be dug up, the tops are cut off with the vines attached, and care is taken not to disturb the plant more than is really necessary. The top is then buried again in the ground, and it and the base of the vine is moulded up with good soil and left undisturbed for about three months, when another yam called the *head* is produced. Plants are then made by cutting the head into pieces, care being taken that each cutting possesses an eye, or bud, from which the new plant develops.

The land is usually lined out at distances of 2 feet each way, or in rows 3 feet apart, the plants being set at distances of 18 feet in the rows. At the site of the pickets the land is dug up, all stones and roots being removed, and the surrounding soil is then raked up so as to form a support for the vine to climb on. Sometimes two plants are set in each hill. The land must be kept weeded, and an occasional moulding up may be necessary, as the heavy rains tend to wash down the hills. Catch crops of maize and sweet potatoes are sometimes taken off the land between the rows; but this system is a bad one, except in very rich soil. From January till April is the best planting season, and the yams require from nine to eleven months to mature. Planting may, however, be undertaken in every month of the year so as to ensure a constant supply of esculent tubers. It has been calculated that an acre of land will yield 4 or 5 tons of yams in the year, and it is said that the same quantity of sweet potatoes may be taken as a catch crop of the ground; this brings the return up to 9 tons—that is, the yield of ordinary potatoes from an acre of good land in England. But as yams and sweet potatoes contain more nutrient matter than the common potato, the actual yield of food is greater in the case of the tropical vegetables.

SISAL HEMP.

The cultivation of this valuable fibre plant appears to attract few land-owners. Yet, as we have several times stated in this *Journal*, the sisal plant practically requires no elaborate cultivation. It will grow to perfection on the poorest as well as on the richest soils, and by judicious cutting, and by never allowing it to flower, it will continue to furnish full crops of leaves for upwards of fifteen years. Each plant will furnish from 25 to 100 leaves annually.

As there are usually about 600 plants on an acre, they would collectively yield from 15,000 to 60,000 leaves per annum. It requires 100 leaves to produce 4 lb. of fibre, so that an acre will produce from 600 lb. to 1 ton of fibre. It is not at all uncommon to have a return of 1½ tons, and with up-to-date machinery there is no reason why from 2 to 2½ tons should not be realised.

As to the value of sisal hemp, its ordinary price is about £40 per ton; and if we deduct even as much as 50 per cent. from this for working expenses, still there remains a profit to the grower of £20 per acre. Many farmers in

America, by planting the sisal aloe in out of-the-way, poor portions of their land, derive as much as £100 to £400 per annum from their sales. For full particulars about the industry, we refer our readers to Vol. I., page 382, of this *Journal*. There is now an excellent opportunity to obtain large numbers of plants of the true *Agave rigida*, var. *sisalana* (or Sisal Hemp), from the Department of Agriculture in Brisbane. They are now growing in quantities at the St. Helena Penal Establishment, where they have been inspected by Mr. C. S. Voller, fruit expert. He states that the plants—suckers and seedlings—are now ready to be shifted, and intending growers should not delay in sending in applications for as many plants as they require.

A MARKET FOR ARROWROOT.

In the hope of assisting the producers of Queensland arrowroot to a better market for that product than is found in Great Britain, the Department of Agriculture has instituted inquiry as to the possibilities of a market in South Africa, with the result that the subjoined reply has been received from the Acting Under Secretary of the Department of Agriculture of the Cape of Good Hope :—

"With reference to your memorandum dated 26th March, inquiring whether there is a good market for arrowroot in South Africa, I am directed to inform you that I have consulted one of the leading importers in this city (Capetown), who reports that, under ordinary circumstances, the market for arrowroot in this country is very limited; but, at the present time, owing to the war, there is a brisk demand, and the price has risen to 9d. per lb., packing in tins included. He is of opinion that, if the arrowroot were shipped at once, it ought to sell well, provided it can be landed here, if in bulk, at not more than 5d. per lb. You will, of course, understand that this Department cannot guarantee the sale at the price mentioned. I may add that the Customs duty on arrowroot is $7\frac{1}{2}$ per cent. *ad valorem*."

There would thus seem to be a good opening at present for Queensland arrowroot in South Africa, and a market which for some time probably will yield a good profit to Queensland shippers.

The present wholesale price of arrowroot in Brisbane is from £11 to £12 per ton of 2,240 lb., or little over 1d. per lb. If sent to the Cape, the shipping and other charges would have to be considered. Freight per ton of 40 cubic feet being 40s., a ton of arrowroot, which occupies, when packed in cases, 60 cubic feet of space, would be charged £3. To this must be added the cost of 20 (1 cwt.) cases, from 25s. to 30s., cartage, commission, and insurance.

Landed in Capetown, the total charges would amount to about 3d. per lb. plus $7\frac{1}{2}$ per cent. *ad valorem* duty, which, presumably, is charged on the cost price in Queensland, and would amount to 15s. to 16s. per ton—about $\frac{1}{3}$d. per lb.

The price in South Africa per ton of arrowroot in bulk is £84. Deducting freight charges, &c., the net return would come to about 5d. per lb., or over £46 per ton.

It should be borne in mind that none but the very best samples should be sent. One bad shipment will spoil the market for ever. The arrowroot season is about to commence, and there will be a large quantity for shipment, in addition to stock on hand. Shippers should be careful to brand their packets and cases "*Queensland* Arrowroot," so that there can be no mistake as to its being the product of the *Canna edulis*. Once a good name is established for our arrowroot in South Africa, all absurd prejudice against our really excellent product will vanish. It should be noted that the Brisbane wholesale price for arrowroot put up in 1-lb. and $\frac{1}{2}$-lb. packets is about £18 10s., and doubtless would bring a correspondingly higher price abroad.

Forestry.

BRIEF NOTES ON SOME TIMBER TREES OF THE BURNETT DISTRICT OF QUEENSLAND.

No. 3.

By J. W. FAWCETT,
Member of the English Arboricultural Society.

64. *Acacia aulacocarpa*, A. Cunn.—Hickory; "Dilkay."

A medium-sized forest tree, with hoary foliage, sickle-shaped leaves, pale yellow flowers in spikes, and thick oblong pods; yields a hard, heavy, tough, dark-red timber.

65. *Acacia Bidwilli*, Benth.—Feathery-leaved Wattle; "Bupeen."

A small-sized forest tree, or large shrub, with corky bark, light green prickly foliage, twice-pinnate leaves, pale yellow globular flowers (November to February), and straight, long, narrow pods; yields a light, close-grained, easily worked timber with dark heartwood and light yellow sapwood; capable of taking a good polish.

66. *Pithecolobium pruinosum*, Benth.—Monkey Fruit Tree; Monkey Pod.

A beautiful medium-sized scrub tree, with downy foliage, twice-pinnate leaves, yellowish flowers (August to October), and long, narrow, flat, curved, and twisted pod; yields a hard, close-grained, yellowish timber, with, often, brownish heartwood, which has a very disagreeable smell when newly cut; not used.

SAXIFRAGEÆ.

67. *Argophyllum Lejourdanii*, F. v. M.

A tall shrub, with silky white branches; large ovate leaves, silvery on the under side; small paniculate flowers, and small fruit capsules. Found only in the Mount Perry district; yields a hard, close-grained, yellow timber.

RHIZOPHOREÆ.

68. *Rhizophora mucronata*, Lam.—Red Mangrove.

A small maritime tree, with thick branches, oval leathery leaves, stiff axillary flowers, and an ovoid fruit which germinates before falling off the tree; yields durable, tough, close-grained timber, with dark reddish heartwood and lighter sapwood. The bark is useful for tanning.

MYRTACEÆ.

69. *Leptospermum flavescens*, Sm.—Yellow Tea-tree.

A small tree or tall shrub, with the young shoots covered with silky hairs; oblong leaves; solitary flowers (July to September), and the fruit a capsule; found on swampy land and in marshes and about freshwater creeks; yields a hard, tough, closegrained, light-coloured timber.

70. *Callistemon lanceolatus*, DC.—Red or Scarlet Bottle Brush; Water Gum.

A small tree, sometimes low and bushy, growing in or near the beds of freshwater creeks and rivers, with narrow, usually silky lanceolate leaves, and clusters of crimson, pink, deep red, or rich scarlet flowers (September to January); yields a hard, heavy, strong, tough, close-grained reddish timber, useful for shipbuilding, wheelwrights' work, knees of boats, axe, chisel, and pick handles, and mallets. The shavings of this timber will bind like a ribbon.

71. *Melaleuca linariifolia*, Sm.—Narrow-leaved Ti-tree.

A tall forest tree with loose papery white bark, short linear leaves, flowers in spikes, and small globular capsules; yields a very durable, hard, heavy, close-grained, dark red timber, useful for fencing posts, building stumps, and wharf piles.

72. *Melaleuca leucadendron*, Linn., var. *saligna*.—Drooping Paper-barked Ti-tree; "Namboor;" "Beethàr."

A large forest tree, generally found in marshy and swampy localities, with white papery bark; long, slender, drooping branches; long, narrow, willow-like leaves; whitish flowers in spikes (August to November), and globular fruit calyx; yields a hard, close-grained, greyish timber, very durable in underground work, and an excellent timber for fencing posts in damp ground, and piles for wharves.

73. *Melaleuca leucadendron*, Linn., var. ?

A tall forest tree, with drooping foliage, growing in marshes and swamps, near the Isis River; has dark red flowers (June to August).

74. *Angophora subvelutina*, F. v. M.—Velvet-leaved Apple Tree; "Buppoo."

A medium-sized forest tree, with persistent fibrous bark, broad, velvety, sessile leaves, small corymbose flowers (September to January), and small fruit capsules; generally met with at the foot of hills, and giving the name of "Apple Tree Flats" to places where it occurs; yields a strong, tough, very durable, close-grained, pinkish-grey timber, subject to "gumveins," but used for naves of wheels by wheelwrights.

75. *Eucalyptus acmenioides*, Schau.—Stringybark; White Mahogany; "Dwwye."

A moderate-sized forest tree, with fibrous persistent bark, ovate leaves, paler on the under side than on the upper, pedunculate flowers, and globular capsules; found on stony ranges; yields a hard, heavy, strong, durable, close-grained, greyish timber, useful for flooring boards and similar purposes, and also for fencing posts.

76. *Eucalyptus pilularis*, Sm.—Blackbutt; Flintwood; "Doolar" or "Dhular."

A very large, tall, and straight forest tree, with a dark-coloured rough and somewhat furrowed bark, persistent at the base, but smooth and deciduous on the upper branches; thick lanceolate leaves, more or less curved; whitish flowers, and semiglobose fruit capsules; yields a hard, tough, durable, greyish timber, excellent for house carpentry, shipbuilding, fencing, and for any purpose where strength and durability are required.

77. *Eucalyptus siderophloia*, Benth.—Broad or Large-leaved Ironbark; "Bul-lel"; "Keggair."

A large tall forest tree, with hard, persistent, rough, thick, deeply furrowed, blackish bark, thick, ovate, lanceolate leaves; creamy coloured or whitish flowers (May to December), and globular fruit capsules; yields a hard, heavy, durable, close-grained, greyish timber, which has a high reputation for strength and durability, and is useful for large beams in building stores, railway sleepers, poles for bullock drays, wharf piles, spokes of wheels, and other purposes where great strength is required; contains a high percentage of kino tannin.

78. *Eucalyptus melanophloia*, F. v. M.—Silver-leaved Ironbark.

A medium-sized forest tree, with a more or less crooked stem; blackish, persistent, deeply furrowed bark, and more or less glaucous or mealy white foliage; small flowers (November and December), and small pear-shaped fruit capsules. Yields a hard, close-grained timber, with reddish heartwood and greyish sapwood; useful for fencing and other purposes.

79. *Eucalyptus crebra*, F. v. M.—Common or Narrow-leaved Ironbark; "By-ee"; "Dooboon."

A medium-sized forest tree, with a hard, blackish, rough persistent bark, long narrow leaves, small whitish flowers, and small fruit capsules; yields a hard, strong, tough, durable, close-grained, pinkish grey timber, valuable for building purposes, railway sleepers, wharf piles, poles and shafts of vehicles' spokes of wheels, and fencing.

80. *Eucalyptus tereticornis*, Sm.—Blue Gum; Slaty Gum; "Yir-ra."

A tall, handsome forest tree, with deciduous bark, lanceolate leaves, white flowers (July to September), and nearly globular fruit capsules; yields a valuable, durable, tough, close-grained reddish timber, useful for housebuilding, ship-building, fencing, poles and shafts of vehicles, plough-beams, paving blocks, and many other purposes.

81. *Eucalyptus tessellaris*, F. v. M.—Moreton Bay Ash; "Kurandoor."

A very graceful, medium-sized forest tree, with a persistent bark, cracked or split into square or angular fragments on the lower part of the trunk, but deciduous on the upper part and branches; linear lanceolate leaves; small creamy white flowers (December to February), and ovoid fruit capsules; yields a tough, durable, close-grained, brownish timber, useful for building purposes.

82. *Eucalyptus corymbosa*, Sm.—Bloodwood; "Boonar."

A fair-sized forest tree, with a persistent, spongy, somewhat fibrous, furrowed bark; thick, ovate lanceolate leaves; large creamy white flowers (November to February), and pitcher-shaped fruit capsules; yields a strong, durable, reddish timber, subject to gum veins, useful (when used whole) for wharf piles, fencing posts, and similar purposes, does not readily take fire or suffer much from white ants.

83. *Eucalyptus maculata*, J. D. Hook.—Spotted Gum; "Mun-garr."

A fine, large, lofty, and handsome forest tree, with deciduous bark, which falls off in patches; ovate lanceolate leaves, large creamy white flowers, and semi-globose fruit capsules; yields a strong, durable, elastic, greyish timber, useful for fencing, wheelwrights' work, and bridge-building.

84. *Eucalyptus maculata*, J. D. Hook, var. *citriodora*.—Citron-scented Gum.

A handsome, medium-sized forest tree, with deciduous bark, and citron-scented foliage, which smells very strongly during wet weather, or when rubbed between the hands. Found between the Burnett and the Boyne.

85. *Tristania suaveolens*, Sm.—Swamp Mahogany.

A handsome, medium-sized forest tree, found along the banks of fresh-water streams, with persistent and somewhat fibrous bark, oval leaves, pretty, white flowers (November to January), and small fruit capsule; yields a hard, strong, tough, durable, elastic, close-grained reddish timber, useful for carpenters' mallets and cogs of wooden wheels; a remarkably fine material for under-ground work, also one of the best timbers for wharf piles.

86. *Tristania conferta*, R. Br.—Bastard Box; "Din-kar"; "Too-too-re."

A fine, large, spreading forest tree, with a smooth, brown, deciduous bark, dense foliage, large ovate lanceolate leaves, generally crowded at the ends of the branches, small, showy, yellowish white flowers (November to January), and smooth, cup-shaped fruit capsules; yields a valuable, hard, tough, strong, durable, close-grained, dark grey timber, useful in shipbuilding—joints, knees, and ribs of vessels—and for wheelwrights' work. It shrinks much in drying. If exposed to wet influences, does not last long.

87. *Syncarpia laurifolia*, Tenore.—Turpentine.

A tall, erect, magnificent forest tree, with a rough, fissured, fibrous, persistent bark on the trunk, but more or less deciduous on the branches; broadly ovate leaves, smooth on the upper side and hoary beneath; clustered at the ends of the branches; white flowers (September to November), and small fruit capsules; yields a hard timber, with dark-brown heartwood and light-coloured sapwood, which shrinks and warps much in drying; valuable for fencing posts

and piles for jetties and wharves, resisting the attacks of the *Toredo nivalis* in saltwater, and for bridge girders and railway sleepers, for shipbuilding, and for various kinds of underground work, where it is very durable.

Myrtus Hillii, Benth.—Scrub Ironwood; Ironwood Myrtle.

A small scrub tree, with very thin, smooth, green (often reddish) bark; glossy, ovate leaves; small, whitish flowers (October to December), and small globular berries; yields a very hard, close-grained, lightish-grey timber, which warps in drying; useful in cabinet work.

CRIMINAL DESTRUCTION OF TREES.

As corroborating our views on the all-important subject of forest conservancy and tree-planting, we place before our readers the following paper on the "Criminal Destruction of our Native Timber and the Advantages of Tree-planting" read by Mr. J. C. Symons at the meeting of the Crystal Brook branch of the Bureau of Agriculture of South Australia, held on 12th May:—

The "criminal" destruction of native timber may seem, perhaps, a little strong to some, but to my mind "criminal" might be enlarged by "very" or "wickedly" criminal. It has been the practice with ordinary scrub farmers to cut, kill, and burn until there is not a tree left big enough to shelter a calf. It is criminal to destroy native timber because of the serious results following. First, it is a protecting agent. Quoting from a valuable paper in the February number of our *Journal of Agriculture*—"When man, actuated by greed or ignorance, or a combination of the two, destroys the protection which nature spreads over portions of our globe, he turns loose agencies which soon pass beyond his control. The protecting agent is vegetation, and whether in the form of forests, brush, or forage plants, and grasses, the balance between it and denuding forests is easily tipped, and then the inexorable law of gravity, unchecked by myriad blades of grass, by leaves, roots, and vegetable moulds, gullies the hillsides, strips the slopes, converts the rivulet into the torrent, and causes the steady flow of the river to become a devastating flood or a parched sand bed. When once this balance has been destroyed, man cannot turn back the torrent and bid it flow once more a living and life-giving stream." Again, desolation and poverty follow the destruction of timber. In all parts of the world this has been so. In Europe, the deserts of southern France once maintained a well-to-do population. In 100 years, through the destruction of native timber, every particle of soil, which it took countless ages to accumulate, has been swept away. In Asia—the southern slope of the Caucasian Mountains—man has everywhere wrought ruin. Every stream, every slope, is marked with destruction. From the mountains down to the plains of Asia Minor is everywhere seamed with ruin, which the unrestrained hand of man has put in force. In America, in the Rocky Mountains, the work of devastation has gone on on a scale that dwarfs anything done in Europe. The axe of the lumber-man, followed by the fires of the sheep-herder, has been an active agent in converting vast areas into deserts as barren as the great Sahara of Africa. The most appalling feature is the absolute indifference with which most of the people regard the terrible results of the destruction of our native timbers. Sand-drift is another result of the destruction of our native timbers. When I visited Port Augusta in 1878, I noticed that the sand had drifted in the main street on to the footpaths and against the shop windows to a depth of several inches. I inquired if this had always been so, and my informant told me that the sand never drifted until after the townspeople had cut down the scrub, or native timber, and then kept a large number of goats, with the result that the sand was continually drifting, and several men, horses, and drays were employed in carting away the drifted sand. It must have cost the town a considerable sum annually to do this. About twelve years ago, soon after the scrubland in Mundoora had been leased, I remember taking part in a discussion at Redhill as to whether the sand would not drift if the scrub were destroyed.

It is now a matter of history that the sand has drifted, and that to an alarming extent. When driving to Mundoora some months since, I noticed that the sand had drifted on the metal in places to a depth of 3 feet. I think I have shown clearly the serious consequences of such forest destruction, but I should just like to say that in our own colony, a few miles from Yankalilla, on the road to Victor Harbour, there is a valley which in great part consists of swampy land heavily timbered. I have heard Mr. O'Leary express his opinion that, if that valley were denuded of its trees, it would be one of the most unhealthy places of that part. As it now stands, people live in its very centre without feeling the ill effects of the marshy air. Now take the value of belts of trees as wind-breaks. I need not say very much about this, but would just like to quote the opinion of those experts who visited the early settlers of the Murray. The land required for tilling purposes, which is all heavily wooded, was cleared by them right back from the water's edge, only a few majestic pines being left standing. The soil, being sandy, drifted, as the wind had play over, say, 1,000 acres or more. The opinion was expressed that strips, say, three chains of the forests, should have been left on the watersheds, or elsewhere suitable, running parallel with each other, to break the force of the prevailing winds. I think this is now being done by some of the settlers with very appreciable beneficial results. Looking again at the part trees play in the health of the community, we all know that they, in common with other vegetation, absorb or inhale, through the pores of their leaves, the carbonic acid gas of the air, which is poisonous to animal life, and that they exhale, or give forth, oxygen, which human beings inhale. Vegetation has a peculiar effect on the atmosphere. In densely wooded tracts the temperature is neither so hot nor yet so cold as in similar tracts which are treeless. The reason is not far to seek. Vegetation retains a normal temperature, 45 degrees Fahr. to 50 degrees Fahr. Trees cast off their perspiration through the spiricles or pores of the leaves, just as a great proportion of the waste matter of our bodies is cast out through the pores of the skin. Exact observations relative to this transpiring show that an average-sized tree will cast off as much as 40 gallons of water per day. Fancy now in a large forest, consisting of a few hundred square miles—say, somewhere in our own vicinity—at the above rate per tree, the amount of vapour which would be added to that already prevalent in the air. The condensation of this vapour, which is caused through the warm moist watery air rising, it being lighter than the dry cooler air which flows in to take its place, as it rises from the surface would result in copious rains. The sap of the trees contains solids and water. Now the solids only are used in building up the frame of the tree ; the water is given off into the air. Then notice again the temperature of the leaves—45 degrees Fahr. to 50 degrees Fahr. Take the following illustration to show what is meant :—In a warm room where a good fire has been burning all day, and a number of people have been gathered together, the air might be thought to be tolerably dry. Bring a tumbler of cold water into the room, and mark what happens. You will see the outside of the glass immediately covered with a fine film of mist. In a little while, minute drops of water will form out of this film and continue growing until perhaps some of them will unite and fall to the ground as drops of rain. The meeting of the two extreme temperatures has caused the formation of the mist, and, latterly, rain. Now from this we infer that if the winds, say, at a temperature of 112 degrees Fahr., sweep over a large tract of forest, the meeting of the two temperatures, 112 degrees Fahr. and 45 degrees Fahr., will do, in a modified way, what was done to the sides of the tumbler in the above illustration. The hot air, which is always moist, will be made to give up some of its moisture, which will condense upon the colder trees, and thus the excessive heat of the winds, ere they leave the belt of forest land, will be considerably modified.

Trees beautify the landscape, as well as supply shade to animals, besides having so many utilitarian uses, that I have not time to produce them here. Geologically, we are told that the roots of trees play an important part in the breaking up and formation of our soil. The rootlets strike through in

all directions until the soil becomes more and more broken, until it passes insensibly into an uppermost dark layer of vegetable soil or humus. Now the percolating moisture which falls from the trees sinks through the humus and forms springs and underground channels of water, from which our river system is supplied. Geologists maintain that South Australia at one time possessed monstrous forests teeming with abundant insect and other animal life, over which hung an area of low pressure with a considerable rainfall where now is an arid desert, similar to the bed of a dried-up ocean over which a high-pressure area exists. No one knows what has brought about this change. That these forests, &c., did exist has been proved by the remains of monstrous animals and birds which are indigenous to heavily wooded and well-watered conditions. Our air here is too dry; there is a great radiation of heat, because our plains are too low, consequently there is always, or nearly so, an area of high pressure to be pushed out of the way whenever a low-pressure area approaches our coast. To modify this evil every one should encourage tree-planting in localities which would be thereby benefited. Take our colony. The population, all told, is something like 360,000. If we were to plant, say, one-third of this number of trees yearly—say 120,000—and one-half of them were to grow on the average, that would mean 60,000 trees annually—say 100 trees to the acre. This would mean 6,000 annually added to our forests. I think the results would be the same in our case as in Algeria, Egypt, &c. The kinds of trees, method of planting, &c., I have not dealt with owing to limited time at my disposal. In conclusion, Sir William Crooks says that more oxygen will have to be generated, and electricity will solve the problem "More oxygen, more rain."

FOREST CONSERVANCY AND THE FOREST RANGER SYSTEM OF THE UNITED STATES.

By A. J. BOYD.

In the western and north-western portion of the United States of America, notably in California, Oregon, Washington, Colorado, and several other States are to be found some of the largest forests in the country. These have been divided into reserves, of which there are thirty-six, covering an aggregate area of 46,000,000 acres. Of late years the people of America have developed a far-reaching interest in the matter of preservation of the remaining forests yet in the hands of the State, and also of affording substantial assistance to farmers and landowners to plant up those portions of their lands which are useless for agricultural purposes with the timber trees of commerce. It is a generally conceded opinion that forestry will never take up its proper position unless it is taken up by the Government, for only a small percentage of the cost of planting can be expected to be returned for a number of years. Then, again, it has well been proved that the work of a forestry department must extend over very large areas, on which, eventually, large machinery could be erected by lessees of various areas on which the timber is ready for cutting. Railways, light lines merely, running into the reserves, would also become a necessity, and would naturally pay right from the start. Another point to observe is that, to carry out the work of conserving the forests in a systematic manner, the lands must be devoted to a crop of timber only, and all unauthorised cutting should be met by prompt punishment; and one of the first principles is to cut timber in such a way that the productive capacity of the forests is never lessened.

People are apt to confound the meaning of forest preservation with the total shutting up of the forests against all timber-getters. The word carries no such construction. The object of the forester is to utilise the timber which has arrived at maturity, and yet to maintain the forests in a condition to furnish constant supplies, just as I once before pointed out the orchardist does with his fruit trees. If he has to remove a fruit tree, he does not leave a blank space.

Were he to do so, his orchard would in time disappear and with it his means of livelihood. So the scientific forester takes care that there shall be no diminution in the number of trees, by planting up the spaces formerly occupied by the mature trees. When trees have arrived at a certain age, either they must be removed or the productiveness of the forest comes to a standstill To avoid this, all mature timber is sold, and a revenue is derived both from it and from the thinnings of closely growing areas.

Mr. Charles H. Shinn, Inspector of the University Experiment Station, of California, says:—

"How simple and reasonable it seems—this utilitarian view of the forests of the State! There is a large portion of California that is worthless for any other purpose except to grow trees and scanty pasturage. It is many times more valuable for growing a timber crop than it is for goats, sheep, or cattle. It is without any other agricultural value. Let us grow timber there, and let us grow it in a systematic and careful way. We can greatly increase the average annual yield of the land; we can have an absolutely safe revenue for all time to come."

The practical forester says: "Here are a hundred thousand acres of mountain land, covered with wild forests. Some of the trees are mature; they will not grow much larger in a hundred years, so I will sell them to the lumber-man. Some of the forest consists of poor kinds, and I will gradually replace these trees with more valuable sorts. In some places I can thin the forests, in others I must have 'mother trees,' and let seedlings grow in brave young thickets. In the course of a century I can very greatly increase the value of this hundred-thousand-acre forest."

Now, all who are interested in the science of forestry acknowledge that the best forests are produced under the system practised in European countries, notably in Germany, but, in a young country like Queensland, the expense attending those systems would break down the resources of our Forestry Department, and our results must therefore come by natural development, our methods of work must improve with the increase of population and revenue.

Now in order to obtain a regular annual income, for the payment of the salaries of conservators, inspectors, rangers, &c, it would obviously be wrong to remove the whole of the timber on a portion of the reserve in one year, for the source of revenue is then gone for ever. Removals of timber must be made to spread over long periods, a certain number of mature sound trees being cut annually. Then, as the smaller trees arrive at the same age, these can be taken out and their places are supplied by seedlings. No part of a large forest should be worked oftener than from five to ten years, except in so far as thinnings and the removal of any trees maturing during the rotation are concerned.

We will consider the case of the various pine trees—hoop, kauri, and bunya pines—and also of the red cedar.

The Kauri increases about 3 inches in diameter annually, and it would require about four years after topping the scrub to attain to 20 inches, and a period of fifteen years would add another 18 inches to its diameter and a proportionate increase of 2,024 superficial feet to its measurement.

A red cedar will attain a diameter of 2 feet in fifty years. A thousand acres planted with cedar, at distances of 20 feet apart, would yield 108,000 trees, containing 178,960,000 superficial feet. The cash value of cedar is about £1 per 100 feet, including cost of cutting. £1,789,000 would thus be the value of 1,000 acres of such trees, fifty years after planting. As there are, however, many millions of feet of mature cedar yet standing, all needful supplies of this, and also of pine timber, can be obtained, whilst the young saplings of all sizes and ages are steadily going on towards maturity. If indiscriminate cutting and wanton destruction of young trees is put a stop to, then Queensland need have no fears for the future.

In any forest, open or scrub, there will always be found a large proportion of dead trees. These are often situated in places where they cannot be yet utilised, but a time must come when all will be required for firewood, and it

will be hauled to the railway lines and rivers, just as we see vast quantities cut near the present lines and sent by rail and river to populated centres. Again, there is a large proportion of unsound trees which it will not pay to cut, but, as they are green and flowering, they serve a useful purpose in sheltering other younger trees and dropping their seeds.

In the yield tables published in the Report on Forestry in the Adirondacks, by Mr. Henry S. Graves, superintendent of working plans, the following, amongst other interesting questions, is given and answered in the tables:—

A man owns 30,000 acres, which yield, on an average, 3,000 board feet per acre of spruce 10 inches and over in diameter. To what limit will it be most profitable, in the long run, for him to cut; how much can be cut annually if he wishes to obtain a sustained annual yield, and how soon can he return to the portion lumbered over the first year, and cut the same amount of timber, above the same diameter limit as at first?

If the diameter is 10 inches the total stand is 30,000 by 3,000 = 90,000,000 board feet; the same yield can be obtained in thirty-six years; the area lumbered annually will be 30,000 ÷ 36 = 833 acres. The annual cut will be 90,000,000 ÷ 36 = 2,500,000 board feet.

The method of supervising the abovementioned thirty-six reserves is very systematic. They are divided into nine districts, each having a general officer, known as a forest superintendent, in charge. Each district is divided into supervisors' districts, the number depending on the number of reserves, total area, and difficulties of supervision, as affected by topography and liability to fires and depredations of all kinds. By the way, I am now quoting from the *Pacific Rural Press.* For each of these supervisors' districts there is appointed an officer called a forest supervisor, who has direct charge of the reserve, or of the portion of the reserve forming his district. There are thirty-nine such supervisors' districts. Each reserve is divided into patrol districts, the size of each patrol depending upon the topography and the liability to fires and depredations, and a forest ranger, whose headquarters are fixed at some central point in his subdivision, is appointed for each such district. There are 350 patrol districts or rangers' subdivisions in the thirty-six reserves. Two hundred and fifty rangers for immediate duty were authorised on 2nd May, 1899, to serve until 15th October, 1899. One hundred additional rangers were authorised to enter upon duty on 25th July to serve until 15th October,* 1899. The rangers report to the supervisors, and are under their immediate supervision. The supervisors report to the superintendents, and they in turn to the Commissioner of the General Land Office at Washington.

The forest superintendents are directly responsible to the Commissioner of the General Land Office for the proper administration of the reserves. They receive from the Commissioner all orders and instructions, and are required to see that these are carried out. The forest supervisor is responsible for the work pertaining to his district, and for the proper discharge of duty by the rangers, and he reports to the superintendent. The respective duties of these officers are described in detail in the following:—

The forest superintendents are required to post themselves thoroughly as to all the rules and regulations governing the reserve, as laid down in a general circular of instructions issued 30th June, 1897, and reissued with amendments 5th August, 1898, and to see that these regulations are enforced, to observe the results of their operation, and to report thereon. They are to obtain information against persons violating the provisions of the forest fire law, and report it to the proper United States Attorney, and to render all necessary assistance in their prosecution. They are to give special attention to the instructions regarding forest fires, and to co-operate with the supervisors in all large and important fires which are liable to get beyond the control of the supervisors and rangers, and, when necessary, to employ additional help to extinguish the fires.

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* The rangers apparently have no duties during the winter months.—Ed. *Q.A.J.*

They are required to study the effect of sheep grazing upon the reserves; to examine as to the question of the free use of timber and stone as provided by the regulations; timber trespasses; lands in the reserves more valuable for mineral than for timber; areas in the reserves more valuable for agricultural than for forest uses. They also have charge of the appraisement of timber to be sold, and many other similar duties. They promulgate all orders from the Commissioner, and examine and pass upon all reports made to him by the supervisors and rangers.

The supervisor must have his headquarters in or near the reserve of which he is in charge. He must familiarise himself with all the conditions existing in his district, especially in regard to forest fires. He must see that notices of the Forest Fire Act of February 24, 1897, which are printed on cloth, are posted in conspicuous places in the reserve; that all campers, hunters, and others found in the reserve are duly warned as to their camp fires, and their attention called to the Fire Act. They have immediate supervision of the rangers, and are required to be in and through the reserve to see that the time of the rangers is fully occupied in patrolling their districts, clearing up old trails, cutting new trails, and performing their duties generally. They make weekly reports of daily services rendered, and monthly reports on the general conditions existing on the reserve. They also make detailed reports to the superintendent on forest fires, showing:

First Class.—The number of camp or small fires found left burning, which were afterward extinguished by the forest officers or rangers.

Second Class.—The number of fires (not included in the first class) which had gained considerable headway before being located and extinguished; total area in acres burned over; number of volunteers, if any, who aided; number of extra men hired, if any, to aid; total amount paid for the extra help; amount of other extra expense incurred (not including amount paid for extra help and for tools).

Third Class.—Number of large and important fires requiring extraordinary effort, time, and expense to extinguish (not included in the first or second class) which were extinguished; total area in acres burned over; number of volunteers, if any, who aided; number of extra men hired to aid; total amount paid for the extra help; total amount of other extra expense (not including amount paid for extra help and for tools).

All Classes.—Total amount expended during the month for tools, the dates of fires, the names and addresses of the parties responsible for their starting, the origin, the damage done, the probable market value of the timber burned, and the effect upon the forest cover and water supply.

The rangers are required to be constantly on guard, to patrol their districts, to extinguish camp and other fires, to report to the supervisor all fires as indicated above, and to carry out their instructions as prescribed by a general circular dated 12th May, 1899. They make monthly reports of daily service rendered, which reports are examined by the supervisors and superintendents, and are then forwarded by the superintendents to the United States General Land Office.

A ranger must provide himself with horse and equipment, while the Government furnishes him with the various implements necessary to open trails in the dense forest, to construct fire barriers, and to extinguish and surround fires. Each ranger is provided with a nickel badge, which is worn as an evidence of his official authority.

Only persons physically, as well as otherwise, qualified are selected for the position of ranger. Old age, indolence, weakness, and intemperance are disqualifications which, when made known to the department, will lead at once to the dismissal of the objectionable ranger. These officers are the sentinels in the forest, and absence from their post of duty is not permissible. This regulation guarantees constant vigilance in the hour of fire peril or timber depredation.

Entomology.

BY HENRY TRYON
Entomologist.

HARVESTING ANTS.*

The author of the "Proverbs," in his well-known admonition addressed to the sluggard, claims consideration for the economy of ants, and alludes to their habit of gathering their food in the harvest—on which account also he elsewhere refers to them as one of the four things which "are little upon the earth but exceeding wise." And again the Augustine poet—using the simile of ants in describing the busy preparations made on the eve of the departure from Carthage—refers to them as ravaging heaps of grain—warned by the approach of coming winter [Virgil Ænid, IV., 395-400]. And other so-called "ancients," amongst their fabulous relations concerning these insects, have mentioned similar habits.

This harvesting propensity of ants was for a long time discredited, and those who thought about the subject were content to accept the explanation of Gould [in "Account of English Ants," 1747], viz.:—That these ancient writers had mistaken for seeds and grain the pupæ, which the ants transport from place to place in order to locate them under circumstances best suited for their development; or, again, they would endeavour by learned exposition to derive some meaning from the expressions used—in allusion to this habit—other than afforded in their legitimate interpretation. Moreover, even the authors of that English classic, "An Introduction to Entomology" [Vol. II., pp. 45-46, Ed., 1817], were—commending the explanation of Gould—inclined to doubt the accuracy of the observations which had suggested allusions of the nature of the above, though they were of opinion that such a habit might possibly be found to exist amongst the ants of intertropical countries.

Since the time when these explanations served their purpose, the ways of ants have been, and are, once more carefully considered, with the result of proving that "the parsimonious emmet provident of future" has really an existence in nature. Colonel Sykes† was perhaps the first to demonstrate the fact that these old authorities did not make use of poetic license in their similes and descriptions, by showing that harvesting ants really exist in India. This naturalist observed in June, 1829, ants bringing up to the surface seed from a store which they had accumulated in their subterranean nest, and which they must have gathered in the preceding months of January or February, when the *Panicum*—which was the grass from which the supply had been derived—ripens its seed. He concluded that on this, as on a similar occasion which took place in October of the same year, the seed had got wet during the prevalence of a monsoon, and was brought to the surface in order to dry it. Colonel Sykes, too, was very careful in verifying his facts, as he was aware that they militated against the observations of entomologists in Europe. His observations related to the ant, *Pheidole providens* (Sykes), West.

* This paper was read on 2nd October, 1885, before the Royal Society of Queensland, and already appears in Volume II. (1885) of its Proceedings. As, however, the publication in question has been long since out of print, and interest in the subject of the paper still lives, the reissue of the latter may appear to be called for. Except for the addition of two footnotes, distinguished by square brackets, the article appears as originally printed.—H.T.

† Trans. Ent. Soc. Vol. I., p. 101. London, 1836.

The Rev. W. Hope,* in 1837, drew attention to the providence of ants, and their habit of hoarding grain as winter store, in order to contrast what had been positively stated on the subject, both by ancients and moderns—including the narrative of Colonel Sykes, with the doubts expressed by the entomologists of his day. He at the same time referred to Bochart [*Hierozoicon*, Vol. III.] for citation of a host of authors all concurring in the same opinion, that certain ants presented this trait.

Mr. T. C. Jerdon incidentally refers to the habit in the above-mentioned Indian ant, and especially dwells on its economic aspect.†

Mr. J. J. Lake describes the depredations of ants upon a pile of unthreshed wheat, lying upon a threshing floor adjoining his house at Zante, and mentions that the seed so carried off was found to be stored up in the nests of these ants.‡

In 1866 M. Lespès wrote in the *Revues des Cours Scientifiques* on the same subject. In the same year also Dr. Gideon Lincecum related§ his observations concerning a Texan ant—"*Myrmica molefaciens*"—which was in the habit of sowing a particular grass, tending the crop, and afterwards reaping the harvest. These interesting particulars had already, in 1862, formed the subject of a communication to Mr. Darwin,|| and they are again repeated, with some omissions, in an interesting popular article—"The Agricultural Ant of Texas"¶ by the same author.

The writer, however, whose published investigations have created the most interest, is Mr. J. Traherne Moggridge, who during a residence at Mentone in the south of Europe, in 1871-72, made the habits of the harvesting ants of that district his special study. Mr. Moggridge first noticed that the ants *Atta structor*, *A. barbara*, and *Pheidole megacephala*, as autumn approaches, were in the habit of storing up the seeds of flowering plants, such as *Polygonum aviculare*, *Capsella bursa-pastoris*, and *Alsine media*, in excavations made by them in the sandstone rocks,** and subsequently was able to confirm his opinion that these ants also made use of stored-up seeds for food.†† The considerable attention which this writer gave to the subject is very evident on a perusal of his popular work on "Harvesting Ants and Trap Door Spiders," London, 1873. In this publication Mr. Moggridge reviews the Biblical and classical notices of the habit of storing-up grain by ants, and the explanation of the notices given by such entomologists as had considered them worthy of comment. He then mentions the occurrence of this habit in three distinct species of ants found at Mentone, and in six others—natives of other countries; whilst he at the same time dwells on the custom of ants carrying seeds only, but not necessarily, with a view to harvesting them.

He then describes and figures the heaps of rejected portions of seeds found outside the ants' nests, as well as the granaries themselves. Mr. Moggridge observed that seeds whilst in the granaries did not germinate, though they did so when removed by him and afterwards sown; and that when in some exceptional cases the radicle in stored grain did sprout, it was afterwards gnawn off —from which he concluded also that the ants first placed some seeds under circumstances favourable to their germination, and that this process was whilst

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* *Vid.* "On Some Doubts Respecting the Economy of Ants." Trans. Ent. Soc., Vol. II., pp. 211-213. London, 1839.

† "Annals and Magazine of Natural History," series 2. 1854. Vol. XIII. Independent testimony to the accuracy of some of the observations recorded by Col. Sykes and Mr. Jerdon will be found in "Wanderings of a Naturalist in India," by A. L. Adams, M.D., pp. 38-39, Edin., 1867. On the economy of this Indian ant, the reader is also referred to the authors quoted by the Rev. W. Hope.

‡ Athenæum, No. 1950, March 11, 1865, p. 35.

§ Proceedings of the Academy of Sciences, Philadelphia, 1866, p. 323.

|| Journ. Lin. Soc., London, 1862, pp. 29-31; *cf.* S. B. Buckley, P. Ac. Philad., 1860 p. 445.

¶ Hardwicke's Science Gossip, Jan. 1868, pp. 1-5.

** Proc. Ent. Soc., Lond., 1871, p. 47.

†† *Op cit.*, 1872, p. 8.

in an early stage repressed by the ants themselves.* These facts are interspersed with many relations concerning other peculiar habits of harvesting ants, and ample justice is done to previous writers, whose contributions to the history of the subject are copiously extracted and summarised.

The next writer who treats the subject systematically is Mr. H. Christopher McCook, author of "The Natural History of the Agricultural Ant [*Pogonomyrmex barbatus*] of Texas."† The work is the result of a three weeks' mission to Texas; undertaken by the author for the purpose of testing the accuracy of the above statements made by Dr. Gideon Lincecum. Unfortunately, Mr. McCook's visit was not so well timed as to permit of his being able to gain evidence of these ants actually sowing seed, but he had abundance of evidence that they reaped the harvest—were harvesting ants. This Texan ant differs from all other species possessing this habit, in so much as it clears a large and nearly circular space of ground around its nest, and it is on the outer border of this disc that the ant rice (*Aristida oligantha*), as it is called, grows, entirely freed from weeds. The seeds of this grass are stored up by the ants in their nest amongst other seed; but "that they are regularly sown in autumn" rests on Dr. Lincecum's authority only. Mr. McCook enters even more fully than Mr. Moggridge into the subject of "the ancient belief in harvesting ants; how it was discredited, and how restored." Then, again, Messrs. Treat and Morris, in the *American Entomologist* [*op. cit.* pp. 225-6; 228-9; 264-5] of the same year—namely, 1879—give an interesting account of two other harvesting ants (*Pheidole pennsylvanica* and *P. megacephala*) from New Jersey. Finally, harvesting ants have been alluded to by various popular writers on entomology, though Louis Figuier seems to have passed the subject over, in that form of his interesting work with which English readers are most familiar.

The investigations of these and other authorities have made us acquainted with the existence of this remarkable trait in at least fifteen species of ants. These are natives of Europe,‡ Asia, and America, and the habit is not necessarily restricted to ants of a tropical climate. They all belong to one sub-family of the Formicidæ, namely, the Myrmicidæ—ants endowed with a sting, and which have two joints in the peduncle connecting the thorax with the abdomen; but they are by no means limited to a single genus, or to genera closely allied. The genera including species of harvesting ants are *Atta*, *Myrmica*, *Pheidole*, *Pogonomyrmex*, *Œcodoma*, *Pseudomyrma*, and *Meranoplus*. All of these are, morphologically speaking, very distinct, and do not comprise species alone, in which this habit is manifested.

It will be readily understood then that, in so much as there is no characteristic structural feature by which this class of ants is distinguished, the peculiar habit of harvesting grain is not due to any special organisation, but that it is

* [This gnawing by ants of the radicle of seeds already stored by them is referred to by Bacon, in a work written by him in 1623 (*cf.* De Dignitate et Argumentis Scientiarum, Bk. V., ch. 2). The credit to be the first to allude to this habit is usually (*cf.* Lubbock, "Ants, Bees, and Wasps," p. 61) upon Aldrovandus, whose book on the History of Insects appeared in 1604. The present writer has, however, found a still earlier allusion to the exercise of this remarkable providence on the part of these insects. This is made by Pierius Valerianus, who lived during the time of Leo X. (1475-1523). The account referred to is to be met with in his *Hieroglyphica*, a work of such rarity as to justify the citation of the passage alluded to:—"Mox et providentiam demonstrabant quia memor hyemis cibaria comparat et recondit, et cellas promptuarias facit, femina interim ne nascantur morsu secat, abrosque condit, ne rursus in fruges exeant è terra, atque inutilia inde sibi ad usum alimenti fiant, quin etiam si ea imbre madefacta senserit, profert atque exsiccat, idque es tantum tempore, cum tranquillum atque serenum præsenserit" (*cf. Op. cit.* Lib. VIII., Cap. II., p. 89, *ed.* Kirchner, 1678).]

† "The Natural History of the Agricultural Ant of Texas; a Monograph of the habits, architecture, and structure of Pogonomyrmex barbatus." [*? M. (Atta) molefaciens.*] London: Trubner and Co., 1879.

‡ We have Sir John Lubbock's authority for the statement that no harvesting ants live in England [British Association for the Advancement of Science, 1878, Section Zoology and Botany]. Mr. J. Curtis, however, states—and he paid much attention to ants and their habits—that *Formica braunea* is one of the species of ants which not unfrequently causes great loss to the farmers by purloining his seed when sown broadcast. [Moreton's Cyclopœdia of Agriculture, 1855, p. 918.] That these seeds are also harvested may be regarded as at least very probable.

rather the result of inherited experience—or what used to be called instinct—of the necessity of some such provision by reason of conditions acting from without; and a certain plasticity in the ant organisation is all that need be taken into account in considerations relating to the adaptability of these ants, and this is often very noticeable, to fulfil the rôle which the possession of the peculiar trait has imposed upon them.

Scarcely any record of the occurrence of this habit amongst Australian ants is to be met with, though such a feature could not have escaped the observation of Mr. Damel, who, in the interests of the Godeffroy Museum, gave such assiduous attention to collecting the ants of Australia, and of Queensland in particular.

The first intimation of the existence of harvesting ants in Australia seems to have been made by Mr. W. E. Armit, F.L.S., in the following letter dated from Dunrobin, Georgetown, 19th July, 1878, and addressed to the editor of *Nature*:—

"I have lately discovered a colony of agricultural ants near Georgetown. The species is very small and red. My attention was first directed to these tiny harvesters by noticing heaps of chaff and hulls in a bare spot, situated in a grove of young acacia trees. The formicaries are entirely subterranean, being entered by a funnel-shaped tube. Roads diverge from this gate in four or five directions, and during working hours are alive with what appears like white insects, the little ants being covered by their load. Some of these ants seem to clean the grain, and carry out the husks, which form a heap round the opening to the nests. The clear space round each opening is small, certainly not more than 18 inches in circumference, and a small mound round, not more than 6 inches in height, is formed with the earth excavated in forming the nest. The only species of grain harvested is the seed of *Perotis rara*, which is light when quite ripe. I cannot give the generic name of these little fellows, never having devoted any special study to the family, but shall be happy to furnish specimens in spirits to any naturalist who will forward his address."*

Still more recently another of our members, Mr. Ling Roth, has written concerning an ant, which Mr. W. F. Kirby refers to as *Meranolopus dimidiatus* (Smith):† "These harvesting ants are found at Mackay, Queensland. They climb up grasses, and carry away the seeds to their nests. The ground near their nests is generally strewn all over with the husks they have brought to the surface."‡

During last autumn the writer observed on Spring Hill, Brisbane, small ants continually passing to and fro from their nest; some homeward bound heavily laden with the florets of the grass *Eleusine indica*, containing ripe seed, and others setting out for some plants growing a few yards distant, where a further supply could be obtained. The nest to which these seeds were carried, and where they were afterwards harvested, was entirely subterranean, and accessible only by means of a small hole, the neighbourhood of which, to the extent of 2 or 3 inches, was covered with the "chaff" of grass seed, and was constantly receiving additions of the same nature from the small ants, who were busily occupied in carrying these dejecta to the border of the heap, and there without fail depositing them. On opening the nest it was also observed to be plentifully stored with winnowed seed of this same grass, *Eleusine*.

These insects belong to the family Myrmicidæ and to the genus *Pheidole*—ants remarkable as having four different classes of members in their communities, viz.:—The males, the females, the smaller workers (neuters), and the larger workers or soldiers (neuters). The latter class is composed of

* *Nature*, 17th October, 1878, Vol. XIX., p. 643. Since the date of this letter Mr. Armit has left the scene of the operations referred to, and so specimens of the harvesting ants, which there is reason to think will prove different to those subsequently mentioned, have not yet been at the disposal of the writer for examination.

† [The species of the genus named, identified by Professor Aug. Forel from material obtained at Mackay by Gilbert Turner, do not, however, comprise this species. They are *M. hirsutus* Mayr, do. a variety, and *M. pubescens*, Sm., var. *fenestratus*, Sm. (*cf.* Proc. Lin. Soc. N.S.W. 1897, p. 144).

‡ Journal of the Linnean Society, Vol. XVIII., p. 328. Lond., 1885.

individuals much larger than the workers proper; they have heads also bigger than their bodies, and are provided with powerful jaws. These soldiers are comparatively few in number, and seldom roam many inches from the nest, where they are probably occupied in separating the glumes from the grain, in the grass florets, and other similar labours.

As far as the writer has observed, these ants do not restrict their attention to grass seeds of one kind, neither to this description of seed only. Exceptionally also they carry off other vegetable matter, and sometimes animal matter, perhaps a minute curculio beetle which has been long dead, a portion of another ant, and at another time insect eggs. The latter habit is a little peculiar; the writer could not refer the eggs observed in this situation to any particular insect, and from their shape does not suspect that they were those of aphides; though ants are known to transport the eggs of these plant lice to their nests, and there as foster-parents to tend them until they are hatched, when they can avail themselves of the food supplies to be derived from the resulting animated sugar-pots, whilst these are still under their care. Moreover, those ants which milk aphides are not exclusively confined to this class of food, as may be easily observed. The ants at present under consideration do *par excellence* feed on grass seeds, which they also store up, and in case of partaking of other food, at such times as grass seed cannot be obtained, reject a considerable portion of it around the approaches to their formicary.

This harvesting ant is not uncommon in the neighbourhood of Brisbane, and is very plentiful in the Botanical Gardens, where its nests are usually surrounded by an accumulation of the glumes of *Eragrostis Brownii.* It is to be hoped that it is not responsible for any want of success which may have succeeded sowings of small flower seeds by the gardeners of that establishment; but, though the present writer does not wish to impute any such action to these little emmets, in explanation of a probable occurrence which may be accounted for by other considerations, usually found in the mind of the experienced gardener, he cannot help calling to mind what Mr. Jerdon has written concerning *Pheidole providens* (Sykes), West—the ants that were the subject of his observations. It is as follows:—"They carry off large quantities of seeds of various kinds, especially the small grass seeds, and as every gardener knows to his cost, more especially garden seeds. They will take off cabbage, celery, radish, carrot and tomato seeds, but are particularly partial to light lettuce seeds, and in some gardens, unless the pots in which they are sown be suspended or otherwise protected, the whole of the seeds sown will be removed in one night. I have also had many packets of seeds (especially lettuce) in my room completely emptied before I was aware that the ants had discovered them."*

As illustrating the wide bearings of the subject of harvesting ants, it may be of interest to remark that Mr. Moggridge approached it not as an entomologist, but as a botanical student. Having casually noticed the habit, he was prompted to make the observations detailed in his work, by the consideration that such habits in ants might be related to the sudden occurrence of plants in certain localities where they had not before been met with, and especially on soil which had been thrown up in digging; the late Mr. Bentham having already, in 1869, directed attention to the little information existing on the origin of plants in such situations.† Nor was Mr. Moggridge led to his investigations, in the first instance, by the purpose of corroborating the testimony of ancient writers; for he only afterwards learnt that European authorities, on the habits of ants, had discredited their statements.

That this Brisbane harvesting ant, also, is an important agent in the local dispersion of plants—especially weeds—and is connected with their sudden

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* T. C. Jerdon, An. and Mag. of N.H., Series 2, 1854, Vol. XIII., p. 50.

† On the occasion on which Mr. Bentham directed attention to this state of things he referred to, as a *supposition* only, the statement of Alphonse de Candolle that: "Il faut donc regarder la couche de terre végétate d' un pays comme un magazin de graines au profit des espèces indigènes,"‡ since no direct evidence of the existence of subterranean stores of seeds had been met with, neither by himself nor by anyone whose recorded observation he had seen. Proc. Lin. Soc., Lond. Presidential Address, May, 24th, 1869. ‡[*Geographie Botanique Raisonée, p. 625. Paris,* 1855.]

appearance on heaps of soil excavated from a depth, is sufficiently demonstrated in the following observations:—The ants of one nest were noticed to be harvesting the seeds of *Portulaca oleracea*, Linn., and of *Amaranthus viridis*, Linn.—both common weeds, and growing at a comparative distance from the nest. These seeds had remained stored up in their nest for some time, when rain suddenly came on, and under its influence the seeds—especially those of the latter plant—commenced to germinate. Of those which had already thrown out a radicle, this was bitten off and brought to the surface; some of these seeds were also gnawn into, and the ruptured black perisperm—containing more or less food substance—in like manner rejected. Other seeds, which had swollen only in response to the moisture, were carried up for the purpose of being dried and re-stored. In the midst of these operations, however, rain came on again, and the ants retired, leaving seeds on the surface. These immediately germinated, and a small patch of *Amaranthus* grew up, marking the site of what was before a nest of harvesting ants, quite isolated amongst plants of different character. On a second occasion a nest, in which much seed of *Eleusine indica* was known to have been harvested some months since, was dug up. Some of the grass seed selected from the nest was afterwards sown; also some of the earth from the nest which was known to contain both seeds of this plant, and of another species of *Amaranthus*. In both cases the sowings were made in situations remote from places in which any of these plants were already growing, and, as a result, in the course of time numerous plants of both *Eleusine indica* and of this second *Amaranthus* sprang up in these new localities, where they continue to flourish.

The genus *Pheidole* to which—as above remarked—the small ant belongs, has representatives throughout the world, and is rather a large one; and though the writer has met with descriptions of, or references to, forty-eight different species, this number will probably be found to fall very short of that of the species which really exist, especially as many members of this genus are, comparatively speaking, diminutive insects or have a very restricted range.* Only six of the forty-eight species are referred to as harvesting ones, viz.:—Two in New Jersey, two in south Europe, one in India, and the present example from Queensland. The habits of the remaining species are very variable, several being found burrowing in rotten wood, and one—*P. javanica*, Mayr—is reported as being restricted to the curious plant *Myrmecodia* (which derives its name from this ant relationship), in which it excavates its galleries.† Two species at least in Queensland are almost entirely nocturnal in their habits, are found in decaying and decayed wood, and probably contribute towards the destruction of forest trees.

The following is a description of the workers of this harvesting ant:—

PHEIDOLE *sp.?*

Workers (major).—Length, 5 m.m. (nearly 3½ lines); head and thorax, reddish chestnut brown, front border of head and mandibles almost black, 2nd node of petiole and and abdomen very dark drown, legs, yellow-brown; hairy; dull, except abdomen, which is bright; mandibles, striated, with punctures here and there on the entire outer surface, masticatory margin with three very obtuse blunt low teeth; shaft of antennæ not reaching beyond the middle of the length of the head. Head longer than broad, with parallel sides; posterior angles rounded and swollen with a deep longitudinal groove dividing the posterior portion; the whole surface of head densely and finely punctate; covered with wrinkles, which are anteriorly longitudinal, converge as the groove is approached, and are transverse and reticulated on the posterior surface. Clypeus almost smooth, with a rounded emargination on its anterior border.

* [According to Dr. C. G. de Dalla Torre (*cf. Catalogus Hymenopterorum*, vol. 7), the species of *Pheidole*, already described up to 1893, were no less than 140 in number.]

† Mr. H. O. Forbes had painful experience of this fact on his first acquaintance with *Myrmecodia*, the life history of which he has so well illustrated. ["A Naturalist's Wanderings in the Eastern Archipelago," pp. 79-82.]

Frontal laminæ short and widely divergent. Thorax densely finely punctate. Pronotum and mesonotum not distinct, forming an elevated disc, with rounded-angular sides and truncated posteriorly, transversely wrinkled, not transversely impressed; metanotum with two sharp teeth, with transverse wrinkles anterior, and densely punctate only between and posterior to them. Petiole densely finely punctate, anterior node compressed, transverse, emarginate above, posterior node not compressed, transverse with a blunt cone on either side. Abdomen smooth, silky, microscopically netted.

Workers (minor).—Length nearly 3 m.m. Reddish-brown, joints of legs and tarsi yellow-brown; dull, except abdomen, which is silky-bright; with erect hairs here and there, most conspicuous on the abdomen, and depressed hairs on antennæ and legs. Mandibles, with a few hairs on the outer surface, longitudinally wrinkled at the base Head closely and finely reticulate-punctate, with longitudinal wrinkles. Clypeus longitudinally wrinkled. Scape scarcely reaching, and not exceeding, posterior margin of head. Thorax closely and finely punctate, without mesothoracic impression, pro- and meso-notum with reticulate wrinkles; a short excrescence sometimes present on the sides of the disc; metanotum with two conspicuous spines. Petiole closely punctate, 1st node emarginate above, 2nd node swollen with pyramidal sides. Abdomen smooth.

Judging only from the description given by Dr. Mayr ["Die Australischen Formiciden," Journ. des Mus. Godf. Heft XII., p. 106, Hamburg, 1876], this species of *Pheidole* seems to most nearly approach his *P. longiceps*. Compared with other examples of the genus found in the vicinity of Brisbane, its colour will at once distinguish it amongst them, as well, perhaps, as the great disparity in the sizes of the two classes of workers, and the excessive development of the head amongst the workers major.

MERANOPLUS.

Recently in an examination of some invertebrates brought by Mr. F. Blackman, from the neighbourhood west of Rockhampton, some ants were noticed belonging to a genus known to include harvesting species, which explained, as was then surmised, and as was afterwards proved, the occurrence also in the collection of a box containing a quantity of the empty glumes of a grass belonging to the genus *Andropogon*.

These ants were much larger than the ones which are above mentioned as occurring at Brisbane, and were only represented in the examples procured by workers of one description, and male insects. Concerning these ants and their habits. and in reply to a series of interrogations, Mr. Blackman informs me to the following effect:—

The ants in question were found at Barwon Park, near Blackwater, and nearly 100 miles to the west of Rockhampton. The soil in which they had elected to place their nest was of that description known as "chocolate soil," a designation which should convey a pretty precise idea of its colour at any rate. This nest was subterranean, and approached by a nearly circular entrance, 3 m.m. in diameter. Its immediate neighbourhood was not conspicuously bare of herbage, but what more especially distinguished the nest was a heap of the hairy husks of some grass, piled loosely around it. Observing this heap, numerous ants were soon noticed coming towards the nest, each heavily laden with a floret of a grass. These florets were found to contain ripe seed, and to be derived from a grass, growing plentifully in the locality, which they seemed to harvest in preference to the seeds of other varieties of grass. The ants carried the florets by fixing their well-developed jaws in the basal portion, and though such loads would seem to impede very much their progression, and though the loose heap of empty husks surrounding the entrance to their nest would appear to impose a formidable obstacle to their gaining it, it was not a

little surprising to witness the adroitness with which they accomplished their object in view, and how skilfully they would manœuvre, and eventually extricate their load from every obstruction with which they came in contact. Whilst these operations were going on ants were ever and anon emerging from their granary, bearing with them husks of the same grass which were empty and deprived of their seeds. These seeds were afterwards found in plenty in the galleries of the nest.

No disparity between the sizes of the ants occupied in the two different operations mentioned was noticed, nor was there anything seen to militate against the conclusion that the same ant which carried a grass-floret into the nest may have also removed the seed whilst below and returned with the empty husk to the surface.

These ants appeared to work slowly and deliberately, with a persistent determination to do their duty, and if molested scarcely quickened their movements, if at all, seldom forsook their charge, and often adopted a squatting attitude,* the very opposite of defiance.

On examination of the material brought by Mr. Blackman from his Barwon Park estate, the writer found (1) a number of reddish-brown very hairy ants, which, from the lateral position of the frontal laminæ, belonged to the Cryptoceridæ—a group of the Myrmicidæ. Their antennæ were nine-jointed, including the scape, and this feature, associated with the presence of other characters, would place them in the genus *Meranoplus*† (Smith), as restricted by Mayr.‡ (2.) A quantity of a chocolate-coloured earthy material, containing a number of grass seeds mostly of one kind, though there were amongst them a few smaller rather roundly-ovate seeds. These seeds were carefully examined for evidence of their having been gnawed or otherwise tampered, without any being found; and there was little doubt but that they would grow on being planted. The soil also contained a number of small, shrunken bodies, which, on soaking, were found to be the dried-up hairy larvæ of some insect. (3.) There was also a quantity of the husks of a grass of a single species, *Andropogon intermedia*, with a few glumes derived from another grass, a species of *Pappophorum*, also amongst it.

The genus *Meranoplus*, to which, as above stated, these last harvesting ants belong, is not nearly so rich in species as is *Pheidole*, and only twenty-one§ appear to have been described. Of this number, six are stated to be Australian, five to inhabit the East Indian Archipelago, two India and Ceylon, one South Africa, six South America, whilst the habitat of the remaining one is uncertain.

I do not find any mention of ants belonging to this genus being harvesting species, except such as contained in the short note of Mr. L. Roth, previously cited, relating to the habits of a particular insect which Mr. W. F. Kirby has identified with *M. dimidiatus*, Smith.||

* This is a very common trait in ants. The *Pheidole* above referred to as exhibiting harvesting propensities in the neighbourhood of Brisbane is frequently robbed in returning food-laden to its nest by a species of *Lasius*, when it adopts this attitude. The manner also in which various Queensland ants allow themselves to be borne away unresistingly by their captors is, too, a phase of the same habit.

† F. Smith, "Monograph of the genus *Cryptocerus*," Trans. Ent. Soc., 2nd Series, Vol. II., p. 213, London, 1853.

‡ Dr. Gustav L. Mayr, "Formicidæ," p. 26 (Reise der Novara, Zoologischer Theil. Bd. II. Abth. I., Wien., 1865).

§ This number includes all the species referred to by Mr. F. Smith, who paid special attention to the Cryptoceridæ, under *Meranoplus*. [Vid. Trans. Ent. Soc., Lond., 2nd Series, Vol. II., p. 213; *ib.* 3rd Series, Vol. 1., p. 407; *ib.* Vol. V., p. 523; *ib.* 1876, p. 603; and Catologue of Hym. Ins. in Col. B.M., Pt. VI. Formicidæ, p. 193, 1858.] Dr. Mayr has, however, adverted to Mr. Smith's inaccuracies [*l.c.* Introduction, p. 4, and Journal des Muesum Godeffroy Heft XII., p. 112, Hamburg, 1876], and indicated that some of these twenty-one species should be more correctly included in the typical genus of the family, and not in *Meranoplus*, as not possessing the generic characters *really* present in the typical species—viz., *M. petiolatus* (Smith) and *M. bicolor* (Guér).

|| "Description of New Species of Cryptoceridæ." Trans. Ent. Soc., Lond. 3rd Series, Vol. V., p. 523.

The present species, as far as the workers are concerned, is one of the largest of the genus, and appears to differ from those hitherto described, amongst which the following definition of its chief characters may serve to distinguish it :—

MERANOPLUS, *sp.*

Workers.—Length, 5·5 m.m. Almost uniformly ferruginous, brown, abdomen red-testaceous or sometimes even almost black. Beset with long, thin, outstanding hairs. The whole upper surface, except the abdomen and the posterior portions of clypeus and metanotum and side of thorax, covered with coarse, often reticulated, longitudinal wrinkles. The pro- and meso-notum together form a convex disc, about as broad as long, bounded laterally by overhanging ridges, which are produced anteriorly into blunt teeth, and have tuberosities in the middle of their length. The metanotum descends, and is armed with two posteriorly and outwardly directed sharp spines, from the bases of which ridges extend to the hinder lateral angles, where they form tuberosities. Hinder border with a semi-circular deep emargination, surface between and behind the spines smooth. Nodes of petiole sub-equal, each longitudinally wrinkled, anterior one angular and posterior one rounded above in longitudinal section. Abdomen microscopically punctate, with larger hair-bearing punctations. Head rounded posteriorly at the angles, the margins produced anteriorly into blunt projecting processes. Clypeus sunk into a deep fossulet, having a small anterior mesial elevation, and two prominent teeth on its margin. Mandibles punctate and wrinkled, having four teeth, of which the outermost is largest. Maxillary palp five-jointed, 1, 2, and 3 joints sub-equal, 4 and 5 together scarcely exceeding third. Labial palp 3-jointed, joints sub-equal. Antennæ densely clothed with depressed hairs, scape less than flagellum, with a distal expansion on the side apposed to it. Attennary fossa reaching little beyond eyes. Legs clothed with long ascending hairs.

In size this ant approaches *M. diversus* (Smith), from Champion Bay, with which it agrees in other characters also. The entirely rugose petiole and its larger dimensions, amongst other features, distinguish it from *M. hirsutus*, Mayr, from Gayndah.

Milk Tests at Biggenden Show.

14TH JUNE, 1900.

	Owner.	Name of Cow.	Lb. of Milk.	Per cent. Butter Fat.	Ll. Commercial Butter.
MORNING.	Mr. Fowler	Victoria	18	3·9	·786
	Ditto	Darkey	$15\frac{1}{2}$	3·8	·659
	Ditto	Lady	16	4·4	·788
	Ditto	Lassie	11	2·8	·344
	Mr. Jones	Louie	15	3·4	·571
	Mr. Summers... ...	Primrose	$18\frac{3}{4}$	3·4	·713
EVENING.	Mr. Fowler	Victoria	$14\frac{1}{4}$	3·5	·557
	Ditto	Darkey . ..	$11\frac{1}{4}$	4·3	·540
	Ditto	Lady	$11\frac{1}{2}$	4·6	·592
	Mr. Jones	Louie	$11\frac{3}{4}$	3·8	·499
	Mr. Summers ...	Primrose	$11\frac{1}{2}$	7·0	·901

TOTALS.

	Victoria.	Darkey.	Lady.	Lassie.	Louie.	Primrose.
Morning	·786	·659	·788	·344	·571	·713
Evening	·557	·540	·592		·499	·901
	1·343	1·199	1·380	·344	1·070	1·614

NOTE.—The above arrived too late for insertion under the heading "Dairying."—Ed. *Q.A.J.*

Science.

FISH IN ARTESIAN WATER.

We are not aware whether any attempt has been made to examine the water issuing from the numerous bores in Queensland with a view to ascertaining whether it contains any form of advanced animal life. A few years since (says the *Scientific American*), a station was established by the United States Fish Commission at San Marcos, Texas. An artesian well was bored, and a flow of 1,200 gallons of water per minute obtained at a depth of 188 feet. The boring was through almost solid limestone, the "log" of the well showing that one tunnel, some 2 feet in diameter, was pierced, but the flow has brought up numbers of living organisms, all new to science. So far, four species of shrimps and a salamander have been described, but these have been abundant. Dr. James E. Benedict of the Smithsonian Institution, described and named the shrimps, and Dr. L. Stejneger, of the same establishment, did the same for the

salamander. He gave it the name of *Typhlomolge Rathbuni*, in honour of Mr. Richard Rathbun, the assistant secretary of the Smithsonian Institution. Its head is large, and prolonged forward into a flattened snout, in which is the mouth. The eyes are covered by the skin, and are visible only as two black specks. Behind the head, the external gills form festoons about the neck, their vivid scarlet making a sharp contrast with the dingy white skin. The four legs are in two pairs, the anterior ones having four fingers or toes, and the posterior

ones five. It terminates in a flattened eel-like tail. Space forbids a consideration of the many questions suggested by the *Typhlomolge*. It may be a link to bygone ages, that became engulfed in some great convulsion, and, although able to exist in its unfavourable environment, was unable to evolve into the modern type. The source and nature of its food, as well as that of the shrimps, are an interesting problem, but its ability to stand variations of pressure is wonderful. A spouting well, 188 feet deep, indicates a pressure of six atmospheres, ignoring friction, yet these beings can live at the surface. Two of them were shipped from San Marcos to Washington in an ordinary preserving jar, and not only survived the journey, but lived for two months more, seemingly unaffected by light or the diminished pressure. No discovery of recent years is of greater interest to biologists or geologists than that of these little beings, unlike anything else on earth.

Gindie State Farm.

Report on Crops for Month ending 31st May, 1900.

Name of Crop.	Planted.	Area.	Drilled or Broadcast.	Manure Applied.		Rainfall during Month.	Growth during Month.	Date Harvested.	Quantity Harvested.	Total Quantity Harvested.
				Name.	Per Acre.					
Wheat—		Acres.				Inches.			per a.	
American Blue Stem	11-4-00	13·14	Drilled ...	...	...	3·01	Poor, owing to want of rain	...	...	...
Marshall's No. 3 ...	13-4-00	38·5	,, ...	...	...	...	,,	...	...	...
Marshall's No. 8 ...	14-5-00	10·86	Broadcast	...	...	...	Fair	...	...	...
Oats	21-5-00	1·30	,, ...	...	...	...	Came up well	...	...	...
Rye	21-5-00	1·05	,, ...	...	...	...	,,	...	...	...
Allora Spring ...	28-5-00	9·61	,, ...	...	...	...	Not up ...	...	...	...
Malting Barley ...	29-5-00	9·70	,, ...	...	...	...	,, ...	...	...	...
Field Peas	31-5-00	2·90	Drilled ...	...	...	...	,, ...	...	...	...

Remarks.—On 10th April commenced to plant 225 varieties of stud wheat, and also to drill in some American Blue Stem. Both these plots came up very well, but, owing to want of moisture, they soon began to wither. The rain in May revived them, and at present date they are looking well. Owing to the continued dry weather during the summer, the stubble and grass that were ploughed down had failed to decay, which made it impossible to use the seed-drill. On the greater part of the area planted, wherever the nature of the land would admit it, the spading harrow was put over that which was sown broadcast, and followed by the seed harrow and roller. A plot each of rye, oats, and malting barley has also been planted. These plots were sown, before harrowing, on the ploughed land, so as to get the seed covered as soon as possible. The rye and oats are up nicely, but the barley has not yet had time to come up. Three acres of field peas have been put in for a trial. These were planted in drills with the corn-planter, 2 feet 3 inches between rows and 18 inches apart in the rows. The quantity of seed wheat used had ranged from 13 lb. to 40 lb. per acre.

Rainfall for May	3·01
Highest shade temperature	95·0
Highest solar radiation temperature	143·5
Lowest terrestrial temperature	30·5

Note.—The above arrived too late for insertion under the heading "Agriculture."—Ed. *Q.A.J.*

F

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

Table Showing the Total Rainfall for each Month of the Year in the Agricultural Districts of Queensland.

Stations.	1899.									1900.			
	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.
North.													
Bowen	9·16	1·46	Nil	0·63	0·21	0·06	0·56	Nil	2·92	7·61	0·40	0·88	0·59
Cairns	12·97	4·03	0·63	2·01	1·31	3·23	0·74	0·33	4·57	43·06	1·98	8·90	3·77
Geraldton	40·65	12·61	1·64	8·93	2·85	9·03	1·03	Nil	4·89	62·26	2·36	8·86	8·86
Herberton	6·74	1·49	0·66	0·23	0·36	1·62	0·18	2·75	0·73	11·90	0·23	1·97	2·19
Hughenden	0·10	0·01	0·20	0·46	2·05	Nil	0·45	1·05	0·33	6·43	1·04	0·01	Nil.
Kamerunga	...	...	...	...	...	...	...	...	...	...	1·01	8·60	3·25
Longreach	0·54	0·58	0·60	1·08	0·28	0·06	0·27	0·67	Nil	1·68	0·48	Nil.	Nil.
Lucinda	14·00	1·71	0·40	2·78	0·80	0·97	0·02	1·26	1·02	37·35	1·71	4·90	4·44
Mackay	9·19	4·74	Nil	2·29	2·37	1·33	0·19	0·49	7·65	20·86	0·65	4·12	2·40
Rockhampton	4·42	2·49	0·40	2·23	1·71	1·96	2·35	1·22	11·02	4·53	0·25	1·64	0·93
Townsville	3·76	0·59	Nil	0·78	0·89	0·01	0·35	0·16	0·53	21·09	0·07	1·68	0·87
South.													
Barcaldine	1·17	0·39	0·05	1·03	0·53	0·27	0·94	0·52	0·04	3·08	0·65	0·09	2·03
Beenleigh	4·26	3·06	5·70	6·95	2·02	3·11	2·53	1·80	7·40	5·42	3·19	3·16	1·25
Biggenden	...	...	...	...	...	...	...	...	...	...	0·40	2·81	0·28
Blackall	0·18	0·13	0·20	1·11	0·57	0·16	1·20	0·04	0·85	1·73	1·31	0·63	0·63
Brisbane	3·32	1·54	2·75	3·50	1·43	2·48	2·26	2·33	7·61	6·51	5·18	3·37	1·38
Bundaberg	4·13	2·92	1·42	2·33	2·62	1·67	1·60	0·06	7·62	4·63	0·86	1·86	1·15
Caboolture	3·85	2·06	2·67	4·61	1·90	2·40	2·30	2·23	7·44	3·04	4·18	5·66	1·42
Charleville	0·52	0·06	0·25	0·33	1·26	0·55	0·36	0·43	0·16	1·01	0·08	0·79	Nil.
Dalby	2·79	1·20	1·33	1·67	1·09	1·20	1·44	1·84	2·89	0·41	6·31	2·80	2·46
Emerald	2·60	2·43	0·03	1·31	2·08	1·96	1·93	1·32	0·40	3·08	1·22	3·97	0·42
Esk	4·11	1·89	2·40	2·59	1·69	2·79	2·67	2·25	5·34	1·42	2·34	4·73	1·50
Gatton College ...	3·32	1·33	1·18	2·01	1·55	2·19	2·13	3·50	5·87	2·40	4·07	3·13	2·24
Gayndah	1·45	1·26	1·30	0·86	3·34	1·24	2·73	4·59	7·37	2·52	2·07	1·11	1·22
Gindie	...	...	...	...	...	...	...	...	...	...	0·57	1·04	0·96
Gympie	4·01	2·89	3·57	2·26	1·23	2·11	2·41	0·39	6·44	5·59	1·84	2·76	1·05
Ipswich	4·11	1·41	1·82	2·42	1·29	2·77	2·04	3·46	4·66	2·79	1·66	1·85	1·47
Laidley	3·66	1·63	1·32	2·00	1·82	5·04	3·17	2·40	6·50	0·64	3·15	2·87	1·94
Maryborough	4·59	3·35	4·20	1·71	1·49	2·29	1·20	0·51	4·13	4·88	1·78	3·26	1·17
Nambour	5·32	3·79	6·17	4·18	1·81	3·13	2·87	3·03	11·11	4·07	5·64	4·67	2·78
Nerang	5·36	2·28	3·34	9·80	2·52	4·74	1·99	1·42	6·31	4·60	3·37	3·06	0·47
Roma	1·70	0·26	0·53	1·05	1·00	0·55	0·35	1·27	0·99	0·43	1·52	4·40	0·23
Stanthorpe	2·53	1·20	1·36	3·11	1·08	1·63	1·36	0·86	3·22	2·62	4·81	1·87	1·70
Taroom	3·52	1·35	0·61	1·27	1·60	1·55	0·83	3·32	0·65	1·78	3·65	2·92	2·11
Tambo	0·52	0·15	0·60	1·16	0·74	0·27	0·79	0·08	0·66	2·28	1·55	0·30	0·02
Tewantin	8·66	6·87	9·28	5·00	3·67	2·80	3·36	0·46	8·22	1·69	4·87	5·36	1·02
Texas	2·37	0·50	3·26	2·95	1·38	1·72	0·97	0·74	2·67	1·56	3·39	1·63	1·48
Toowoomba	3·68	1·33	2·11	1·75	1·63	3·15	1·43	2·36	4·75	1·01	2·90	2·87	2·00
Warwick	4·13	1·03	1·53	2·44	1·00	1·99	2·48	1·67	3·83	1·84	4·19	1·93	1·01
Westbrook	...	...	...	...	...	...	...	...	...	...	3·71	1·78	1·81

A. W. ANDERSON,
Acting Government Meteorologist.

QUEENSLAND PRODUCTS IN BRITISH MARKETS.

Butter.—Choicest Australian, 90s. to 94s.; finest, 86s. to 88s.; choicest New Zealand, 90s. to 94s.; choicest Danish, 102s. to 104s. per cwt.

Cheese.—New Zealand choicest, 59s. to 60s. per cwt.; American, 59s. to 60s.; Australian, no quotation.

Sugar.—Refined, £14 to £15 per ton; syrups, £9 10s.; Java, £9 10s. to £10 10s. per ton; German beet, 88 per cent., 9s. 7d. per cwt.

Syrups.—4s. 9d. to 11s. per cwt.

Molasses.—5s. to 6s. per cwt.

Rice.—Patna, 12s. 9d. to 22s.; Java, 12s. 3d. to 20s. per cwt. in bags, 16s. 6d. to 26s. in barrels.

Coffee.—Finest Coorg peaberry, 58s. to 100s. per cwt.; Ceylon plantation, 116s. per cwt.; bold blue, 123s.; Santos, 37s. to 39s.; Long berry Mocha, 102s.

Arrowroot.—Natal, 6¾d.; St. Vincent, 3⅜d.; Bermuda, 1s. 2d. to 2s. 3½d. per lb.

Wheat.—Australian, 29s. 3d. per 480 lb. to 30s. 6d. per 496 lb.; about 3s. 8d. to 3s. 9d. per bushel. American, 31s. 6d. to 32s. 9d. per quarter; German, 34s. per quarter.

New Zealand Oats.—22s. 6d. to 23s. 6d. per 384 lb.

Ginger.—Calicut, rough, 22s. to 23s. per cwt.; medium, 65s. to 100s. per cwt. Jamaica, ordinary, 52s. to 65s. per cwt.; finest, 110s. to 140s. per cwt.

Pepper.—Long red chillies, 56s. to 75s. per cwt.

Tobacco.—Prices for pipe tobacco on 1st May, 1900—Pipe tobacco:—Kentucky leaf: Common to fair, 3d. to 5½d.; coloury, good to fine, 7½d. to 9½d.; Kentucky strips: Common to good, 3½d. to 7½d.; fine, 8d. to 11d. Virginia leaf: Common to fair, 3d. to 6d.; coloury, good to fine, 8d. to 13½d. Virginia strips: Common to good, 4d. to 8d.; fine, 8d. to 12½d. Cigar: Sumatra, 7d. to 5s.; Manila, 3d. to 4s.; Havana, 8d. to 5s.

Wine.—Fair red wine (Australian claret type) in bond, 2s. to 2s. 6d. per gallon; fine old quality, 4s. 6d. per gallon; ordinary London port, £10 per pipe of 110 gallons; Marsala, £12 per pipe of 96 gallons.

Green Fruit.—Apples: South Australian, 10s. 6d. to 14s.; Tasmanian, 13s. to 20s. Pineapples: No quotation. Oranges: 10s. to 13s.; selected, 20s. to 30s.; others, 10s. to 13s. per 420. Bananas, 10s. to 15s per bunch. Shipments of Tasmanian apples brought, on 12th June, 10s. 6d. per case (apples heated).

Eggs.—Australian, none quoted; Irish, 5s. 8d. to 6s. 3d. per 120; Danish, 6s. 6d. to 7s. per 120; French, 6s. to 6s. 3d. per 120.

Honey.—Chilian, 24s. to 32s. per cwt.

Olive Oil.—£50 to £63 per tun (252 gallons). Eating oil, 4s. to 5s. per gallon. Linseed oil, £31 per tun.

Sisal Hemp.—£18 to £30 per ton.

Wool.—Since last sales, greasy merino superior, fine greasy crossbred, and medium scoured crossbred are 1d. to 1½d. per lb. lower; greasy merino, medium and inferior coarse scoured crossbred are ½d. to 1d. per lb. lower; medium greasy crossbred is ½d. per lb. lower; coarse greasy crossbred is par to ½d. per lb. lower; fine scoured crossbred, medium to good scoured merino, and inferior scoured merino are 1½d. to 2d. per lb. lower; superior scoured merino has declined 2d. to 3d. per lb. The fourth series are fixed for 3rd July, and lists will close when new arrivals reach 150,000 bales. The statistical position of the staple is stronger than ever, but the large carry-over may retard recovery unless the element of reduced production exerts its influence.

FROZEN MEAT.—The latest quotations to 16th June for the various descriptions of frozen meat are:—New Zealand mutton (crossbred wethers and maiden ewes): Canterbury, 4⅞d.; Dunedin and Southland, ——; North Island, 4⅝d. Australian mutton (crossbred and merino wethers): Heavy (over 50 lb.), 4 3/16d.; light (under 50 lb.), 4 3/16d. River Plate mutton (crossbred and merino wethers): Heavy, 4¼d.; light, 4¼d. New Zealand lambs: Prime Canterbury (32 lb. to 42 lb.), 5¾d.; fair average, 5⅝d. Australian lambs, 5⅛d.; fair average, 5⅛d. Australian frozen beef: Fair average quality ox forequarters (100 lb. to 200 lb.), 2¾d.; hindquarters (180 lb. to 200 lb.), 4⅛d. New Zealand frozen beef: Fair average quality ox forequarters (100 lb. to 200 lb.), 3d.; hindquarters (180 lb. to 200 lb.), 4½d.

The above prices are the official quotations furnished by the Frozen Meat Trade Association. The basis of quotations is sales of lines of not less than 100 carcasses of mutton or lamb, or 25 quarters of beef. All the quotations for mutton are for average quality. Quotations for New Zealand and Australian lambs do not include sales of small lambs, or heavies, or inferior quality.

BACON.—51s. to 66s. per cwt. for lean, sizeable; fat, stout, 52s. to 58s. per cwt.

HAMS.—Canadian, 56s. to 60s. per cwt. Irish (smoked): Special brands, 78s. to 96s.; fine, 68s. to 78s. per cwt.

HIDES.—Queensland bullock, heavy (52 lb.), 5⅞d. to 6d. per lb.

SKINS.—Sheepskins on 16th June were dull of sale. Combings declined ½d. to ¾d. per lb., and short-woolled skins ½d. per lb.

FURRED SKINS.—Kangaroo: First gray, 2s. to 2s. 2d. per lb.; second gray, 1s. 10½d. to 1s. 11d.; first red, 1s. 11d to 2s. 1d.; second red, 1s. 8½d. Wallaroo: 1s. 9d. Wallaby: 1s. 4d. to 1s. 7d. per lb. Opossum: 5½d. to 1s. 2¼d., according to quality. Tasmanian: First black, 4s. 3d. to 6s. 9d. Victorian: 1s. 5d. to 2s. 3d. Wombat: Large silver, 9d. to 1s. 2d.; small red and inferior, 2d. to 4½d. each.

TALLOW.—On 13th June, mutton tallow, fine, brought 27s. per cwt.; medium, 25s. 6d.; beef, fine, 26s.; medium, 25s. per cwt.

HORNS.—Extra large, 60s. to 75s.; large, 47s. to 55s.; medium, 15s. to 42s. 6d.; small, 12s. 6d. to 20s. per 100.

BONES.—Shanks, round, £6 15s. to £7 12s. 6d.; flat, £4 to £4 2s. 6d.; mixed, £4 to £4 17s. 6d.; inferior, £3 12s. 6d. to £3 15s. per ton.

WEIGHTS OF FARM PRODUCE.

The weights of farm produce, as regulated by law, are:—

Maize, 56 lb. to bushel	Wheat, 60 lb. to bushel
Oats, 40 lb. to bushel	Cape Barley, 52 lb. to bushel
Bran, 20 lb. to bushel	Malt Barley, 50 lb. to bushel
Pollard, 20 lb. to bushel	Flour, 2,000 lb. to ton
Pollard, 2,000 lb. to ton	Bran, 2,000 lb. to ton
Potatoes, 2,240 lb. to ton, or 112 lb. to cwt.	Chaff, 2,240 lb. to ton
	Hay, 2,240 lb. to ton

General Notes.

BLASTING TREE STUMPS.

In previous issues, we have drawn attention to the use of explosives in saving labour for removing stumps of trees from ground about to be prepared for gardens and orchards. Dynamite, more particularly, has been commented upon as being readily got and of convenient handling. Professor Rungelman (says the *Rural World*, from which we take the figures), recommends simpler processes. In the first case (Fig. 1) a belt of dynamite is fastened round the stump, *a*, *b*, *c*, the fuse being at *d*. In the second case (Fig. 2) a hole is bored to the centre of the stock, the dynamite cartridge is inserted at *e*, the fuse being at *f*.

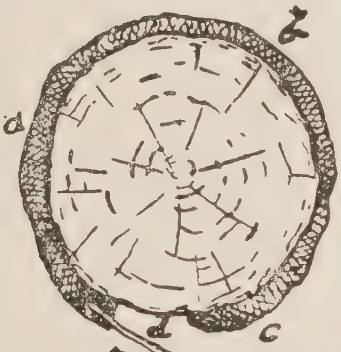


Fig 1

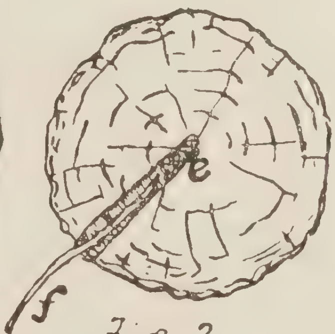


Fig 2

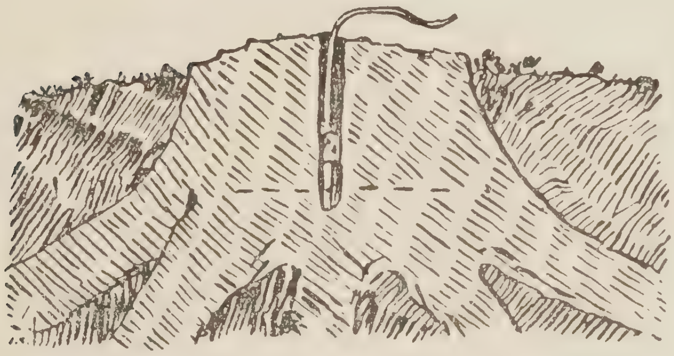


Fig 3

In the French forests a stump which would cost 10s. to remove by hand is extracted with but little labour, after the explosion of a cartridge containing about 13 oz. dynamite, costing about 1s. 8d.

The following is an example case of a raw stump of oak (Fig. 3) 33½ inches in diameter :—A cartridge of 3½ oz. was placed at the bottom of a hole pierced in the centre to a depth of about 16 inches. The stump was split into four almost equal parts. The soil was disengaged to a depth of about 16 inches, and round the sides to the extent of about 24 feet. The cost amounted in all to 3s. 3d., whereas the amount which would have been paid to a labourer for hand extraction would have been 5s. 6d., at the rate of 2s. 2d. per day.—*Agricultural Journal, Cape of Good Hope.*

TO PREVENT MOULD IN CORN BINS.

It very often happens that grain stored in bins begins to sweat, and becomes mouldy in consequence. A simple remedy for this is suggested in the *American Cultivator*. It is to drive the hand deep into the mass of grain occasionally, and if it feels abnormally warm (if a thermometer is handy, and

is used, when the temperature indicated is over 100 degrees Fahr. there is something wrong), some ordinary bricks, thoroughly dried in the oven, should be placed in the bin. The bricks will speedily absorb the moisture, which leads to mould, and keep the grain in good condition.

HOW TO MAKE DWARF TREES FOR TABLE.

A curious but successful way of dwarfing plants for table decoration is to take an orange, and, having cut a small hole in the peel, to remove all pulp and juice, fill the skin thus emptied with some cocoanut fibre, fine moss, and charcoal, just stiffened with a little loam. In the centre of this put an acorn, date stone, or the seed or kernel of any tree that it is proposed to obtain a dwarf from Place the orange peel in a tumbler or vase in a window, and moisten the contents occasionally with a little water through the hole in the peel, and sprinkle the surface with fine wood ashes. In due time the tree will push up its stem through the compost and its roots through the orange peel. The roots must then be cut flush with the peel, and the process repeated frequently for some time. The stem of the tree will assume a stunted gnarled appearance, making it look like an old tree. When the ends of the roots are cut for the last time, the orange peel, which, curiously enough, does not rot, may be painted black and varnished.—*N. Y. Advertiser.*

RUDYARD KIPLING ON QUEENSLAND.

Mr. Rudyard Kipling has visited the Queensland stall at the Norwich Agricultural Show, and our emigration lecturer, Mr. Randall, has evidently impressed the "Absent-minded Beggar." Mr. Kipling writes as follows in *Longmans' Magazine*, under the heading "What Can a Man Want More?":—

In one of the galleries of the hall at a Norwich Agricultural Show the Queensland Government has a stall, set there, doubtless, to attract the intending emigrant. I must say it attracted me. Such heads of Indian corn, such samples of wheat and barley, the latter a little pale-coloured, perhaps. The gentleman at the stall gave me a bundle of literature, which I perused all the way home, with the result that by the time I reached Ditchingham I felt inclined to book a passage for Queensland by the next steamer. A country which is twice the size of the German Empire, with a nice, warm climate and a death rate of only 12·10 per thousand, where anything will grow, from a pineapple to a cabbage, where horses, sheep, and cattle flourish; where, in short, nothing is lacking—what could a man want more? Moreover, there the land is dirt cheap, and arranged in lots to suit all purses; and—best of everything—the British flag flies over it, with nobody to question its supremacy.

What says the little book which was given to me? Foreign competition, high rents, bad seasons, &c., render the cultivator's life here an unending effort to keep his head above water. Why not close the conflict, and go to a land where labour and money, properly invested, are sure to return good interest? Many will be inclined to echo the question, Why not, indeed? But I hold no brief for Queensland, of which I know little. Doubtless it has its drawbacks like other places. Within the giant circle of the British Empire are several such favoured lands, whose fertility and wholesomeness literally cry aloud to man to take his profit from them.

What I do hold a brief for, what I do venture to preach, and to almost every class, is emigration. Why should people continue to be cooped up in this narrow country, living generally upon insufficient means, when yonder their feet might be set in so large a room? Why do they not go to where their families can be brought into the world without the terror that if they are brought into the world they will starve or drag their parents down to the dirt; to where the individual may assert himself and find room to develop his own character, instead of being crushed in the mould of custom till, outwardly at any rate, he is as like his fellows as one brick is like the others in a

wall? But in those new homes across the seas it is different, for there he can draw nearer to Nature, and, though the advantages of civilisation remain unforfeited, to the happy conditions of the simple uncomplicated man. There, if he be of gentle birth, his sons can go to work instead of being called upon to begin where their father left off, or pay the price in social damage. There his daughters will marry and help to build up some great empire of the future, instead of dying single in a land where marriage is becoming more and more a luxury for the rich. Decidedly emigration has its advantages; and if I were young again, I would practise what I preach.

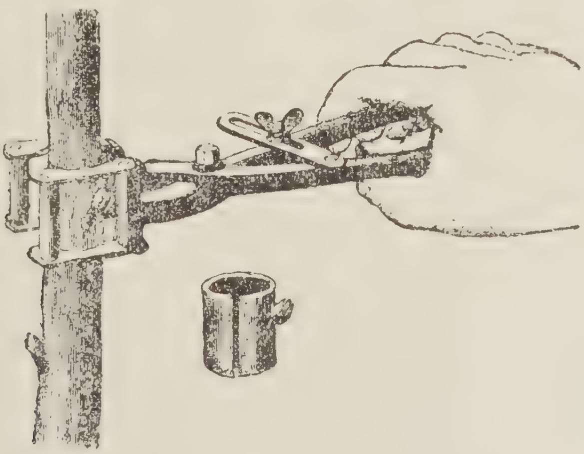
THE SUGAR CROP.

The cane crops in the Cairns district are said to give promise of excellent results. The farmers are paying considerable attention to renovating the land by fertilisers, and to more intense cultivation. This, combined with the late fine showers, has induced good growth, and it is hoped that nothing will occur to spoil what promises to prove a heavy crop next season.

The *Mackay Mercury* states that the Marian and Racecourse Central Mill companies have sold the coming season's crop to the Millaquin Refinery. The price they receive is 1s. 3d. more per ton than that offered by the Colonial Sugar Refinery Company, with similar concessions regarding bonuses, and some additional advantages in the matter of advances at the port of shipment.

A TOOL FOR TRANSPLANTING BUDS.

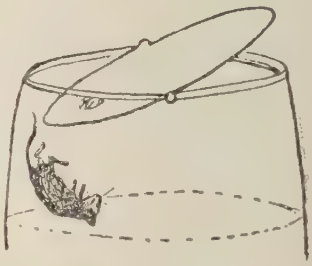
The device illustrated herewith we take from the *Golden Penny*, an illustrated paper issued by the proprietors of the *Graphic*, London. It is a tool, lately invented by a Mr. Duncan Galbreath, by means of which buds may be transplanted without injury. The tool consists of two pivoted handles or



levers, each having a cross-head upon one end. To each cross-head a pair of blades is screwed, formed with concave cutting edges, so that when the handles are brought together, only the top and bottom portions will touch. The space between the blades is open, so that the bud cannot be injured. The pairs of blades, constituting jaws in effect, are held in adjusted position by a link which is pivoted to one handle, and which is made to receive a set screw carried by the other handle. The jaws are fitted to the exterior of the limb, twig, or branch, the bud being midway between the pairs of jaws. After the blades have been closed firmly around the branch and locked in adjusted position, the tool is turned so as to cut a sleeve or ring of bark from the branch as shown in the small figure on the right. The limb to which the bud is to be transplanted has a section of its bark removed by a similar tool, the space thus formed corresponding in length with the sleeve of bark carrying the bud to be transplanted.

THE BARREL RAT TRAP.

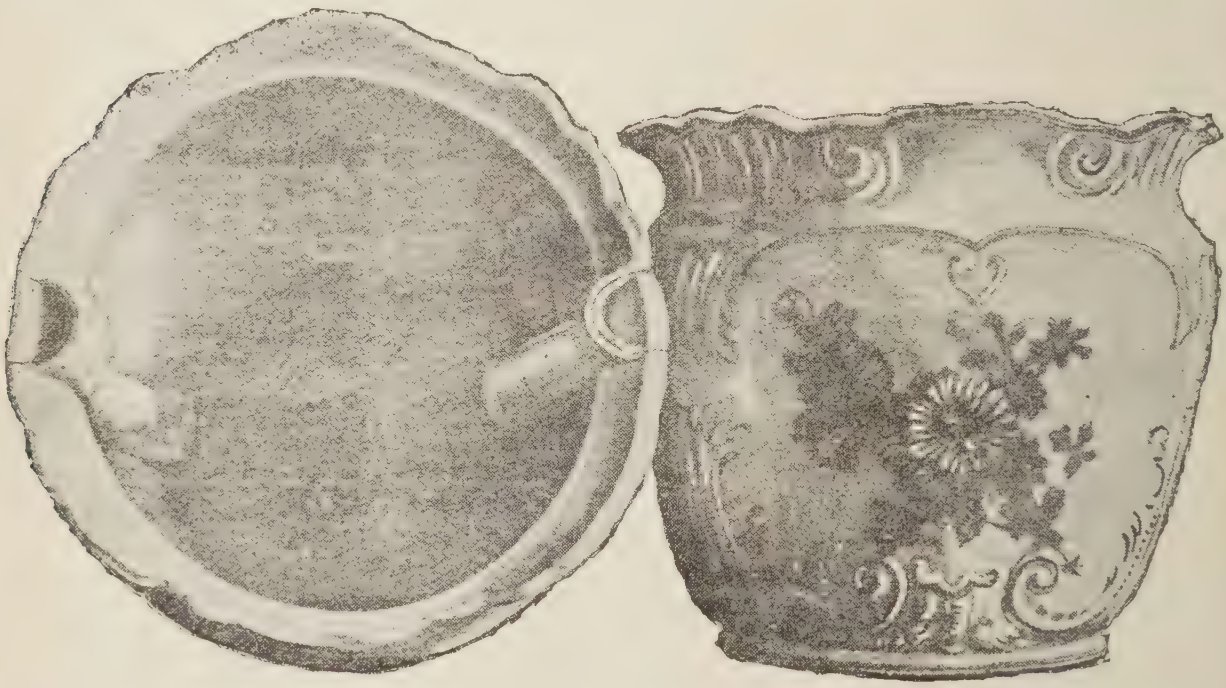
This is no new device, but at the present time, when all kinds of "dodges" are tried to seduce the wily rodent, it may prove of service to illustrate it. The *Sydney Mail* gives the following description of the trap :—



The device shown is one that has been frequently used to trap native cats and other vermin. In London at the present time it is the means of destroying thousands of rats in large cellars and warehouses. The barrel should be let in so that the swinging door is about level with the floor, but, if this is not practicable, spars or boards should be placed from the walls or the floor to the edge of the barrel, so that, the rats can run along to the bait. The swinging cover must work easily, so that when the rat's weight is felt it tips instantly, and does not give the rat a chance to jump for the edge. With a piece of toasted cheese firmly fixed on the cover, a number of rats can be induced to "walk the plank" in a single night. At present it would be wise to put fluid or disinfectant in the water. The water should be deep enough to drown the rats, but not high enough up to allow them to climb up.

A NOVEL FLOWER POT.

We have had brought under our notice the "Toogood Sub-Irrigated Pot," sold by Messrs. Toogood and Sons, Southampton. The principle of this pot may be summed up as follows:—By means of two pipes reaching from the top



to the bottom of each pot, thorough aeration is ensured, and all water is carried directly to the bottom, whence it rises by capillary attraction to the surface soil, as it would do under natural conditions. The result of this application of water only directly to the lower soil is that the surface soil of sub-irrigated pots is always loose and friable, instead of being hard or sodden and mossy, and impervious to the atmosphere.

Table and window plants thrive better in one of these sub-irrigated pots than in ordinary flower pots, because the aeration is much more perfect. Practical experience teaches us that the vigour of pot plants depends on the amount of air the roots can obtain, and that imperfect soil aeration always

checks the respiration of roots, and so results in sickness and loss. Another advantage of these pots is that there is less danger of overwatering and its resulting diseases than when the ordinary system of watering is carried out, whilst no water can possibly drip from the pot, as there is no drainage hole in the bottom. When flowers are grown for ornamenting the room it is often difficult to find an ornamental pot which will fit the ordinary pot in which the flower has been grown; but with the Toogood Sub-Irrigated Pot this difficulty is overcome, for the flower is planted directly into the ornamental pot. Sub-irrigated plants seldom require re-potting more than once a year, if so often.

A word may also be said as to the culture in these pots. The best potting soils are those that are porous and somewhat light, and we may mention that such can be prepared by mixing good, unriddled garden loam with unriddled leaf mould, and enough sharp sand or road-scrapings to prevent the compost feeling sticky to the hand. In regard to potting the plant is turned out of its ordinary pot, and has its fitted mass of healthy rootlets slightly broken up with a sharp stick, and the diseased roots cut away preparatory to planting in loose, moderately moist mould in the Toogood pot. For drainage, 1¼ inches or 1½ inches of broken brick, coal, charcoal, potsherds, or other drainage should be placed in the bottom of each pot before any soil is added.

The Toogood Sub-Irrigated Pots are very handsome, being made of the finest and strongest ivory white ware, relieved with a raised pattern, chased with fine gold, and variously decorated with elegant designs of lilac, peonies, carnations, &c., in their natural colours. It will thus be seen that, in addition to possessing great advantages over the ordinary flower pot, they form a most pleasing home decoration, and, as they are sold at a very moderate price, they are within the reach of everybody who cultivates flowers for pleasure.—*Mark Lane Express.*

COFFEE IN ST. HELENA.

A home paper says:—Coffee has striven for existence, as the trees still flourish and bear abundant crops of excellent quality of the old Mocha stock, but not through careful cultivation, for this has been seriously lacking. Governor Sterndale, who has seen the care taken in India in pruning, manuring, hoeing, &c., wonders at the generosity of the St. Helena tree, which often bears its white starry blossoms whilst the pickers are gathering the ripe fruit. There is much land now devoted to pasturage which would yield much better returns under coffee cultivation, notwithstanding the fact that labour is dear. The trees do not require so much attention as in many other coffee-producing countries. The picking can be done by girls at 6d. a day, so long as they are supervised by skilled women who work for 1s. per day. Ordinary labourers' wages have now gone up to 2s. 6d. per day, owing to military and other works in hand. We may expect soon to see St. Helena coffee advertised, with a testimonial from General Cronje as to its super excellence and soothing capabilities.

EGGS.

J. W. M., in the *Adelaide Observer*, writes:—As was anticipated some months ago, the egg supply has greatly decreased, and as a natural consequence the prices have gone up considerably, whereas only a few months ago they were only worth 5d. per dozen, now the values are over 1s. wholesale, which means about 1s. 3d. to 1s. 4d. retail, and there is every likelihood of further advances in prices, as the majority of the old hens have been disposed of to make room for the younger stock, which, generally speaking, will not begin to lay for several months. In consequence of the wintry weather setting in earlier this year than usual, this scarcity may be the more marked. There will be a certain amount of produce from the non-sitting varieties, and those who do not feel the cold so keenly as others will continue to lay for a time. Thus it behoves us to look to the good laying fowls, and by manipulation to keep a good supply of those that we find produce good results in the winter months. It is not altogether the special breed that may bring about this good result, but selection of various

members of these particular breeds that are above the average laying powers of other members of the same kind. By studying this, and shutting up by themselves those so selected, and breeding from these, with which should be placed a strong, healthy sire, likewise derived from acknowledged good laying stock, then we shall be able to procure a flock that will produce a bountiful supply of eggs at that season when the majority of fowls cease laying. A great deal depends upon the feeding, for you may take the best-laying fowl you like, and treat it improperly and feed it badly, and you will soon have quite an ordinary object of the yard in its place.

In the *Agricultural Gazette* some valuable information is given in reference to prices of eggs, and the quantities imported into Great Britain during last year, in which it says that the foreign imports of eggs per head of the population of Great Britain in 1899 was 55, and this method of estimation is to be preferred to that adopted by the Board of Agriculture, which it is believed includes the population of Ireland, although that is an exporting and not an importing section of the country. Not only was there last year a vast increase in imports, but as compared with 1898 a higher average value of eggs. The prices for eggs imported, when taken on an average for the last three years, have been, in 1897, 6s. 2½d. per long hundred; in 1898, 5s. 10d.; and in 1899, 6s. 2¾d. showing an increase of ¼d. upon the highest average. In the various countries prices vary considerably, as during the year 1899 those from France realised 7s. 7d. per long hundred. Canada comes next with 7s. 2¼d., then Belgium with 6s. 2d., and following on Denmark 6s. 0¾d., Germany 5s. 7d., and Russia 5s. 5¾d. Other countries not mentioned, which would include Australia, averaged the same as Denmark, 6s. 0¾d. This difference in price varies considerably in the size and flavour of the eggs, and this variation is very wide. The Russian samples that I inspected while on a visit to the old country were very small, as were those I saw from other European countries. And in speaking of the flavour, I cannot say that it compares favourably with our Australian article. They appear to possess a kind of musty flavour. Whether this is so when freshly laid, or whether it was on account of keeping, I cannot definitely say, but I think from inquiries made that the flavour is characteristic, and, therefore, the local article is much preferable. There is no reason why, with careful selection of the best, we should not compete successfully with either France or Canada in size, flavour, and prices; but, of course, it takes time to gain a "name." It may well be asked, "What's in a name?" But, no doubt, in these times of strict competition there is a lot in it, and in the words of the old proverb, "Give a dog a bad name, and you may as well hang him." So let us obtain a good name for our produce sent away, and take care that we keep it.

While dealing with the best laying fowls and their produce, the results of the competition in connection with the Utility Club of England has come under my notice through the medium of the *Australasian*, which states that the final result of the laying competition in connection with the club has come to hand, and it will be of great value from a practical standpoint both to the "fancier" and the "farmer," and will help many to decide which are the best layers. The conditions under which they were kept, fed, &c., and the ages of the various kinds have not yet been received, and they will be awaited with intense interest. The competition lasted for sixteen weeks, which seems somewhat short to record every point that is necessary. In all probability, however, the club will hold other competitions at other periods of the year to gain information as to the best fowls to keep for various times of the year. The present contest was held during the winter months, starting in the middle of October and ending on 14th February. Silver Wyandottes have come out top in this instance with a total of 223 eggs, equalling 446 points. In scoring it must be borne in mind that two points are given for every egg weighing over 1½ oz. Brown Leghorns come next, although they are a long way behind the winning pen. The egg yield was 161, and the number of points gained 322; but it is thought that in a summer competition these fowls would run closer for top position. Buff Orpingtons and Langshans —both recognised winter layers—come third and fourth with a total of 151

and 132 eggs, and in points 299 and 261 respectively. Flaverolles take fifth place with 124 eggs and 244 points. Then come in the routine as placed—Black Leghorns, 119 eggs and 238 points; Black Orpingtons, 118 eggs and 236 points; Golden Wyandottes, 103 eggs, 206 points; White Leghorns, 101 eggs, 202 points; Buff Leghorns, 96 eggs, 192 points; Minorcas have eleventh place with 94 eggs and 188 points, but, with others, would pan out better in hotter weather. Anconas come next with 80 eggs and 160 points; Golden Wyandottes (Pen No. 2), stand in the thirteenth place, with 80 eggs and 159 points; White Leghorns, another good summer layer, 70 eggs and 139 points; Plymouth Rocks, 64 eggs and 128 points; Bluff Leghorns last with 61 eggs and 122 points. It must be taken into consideration that one pullet in this pen died before the competition was completed, or they would have had a bett r total. It would be a good experiment if some of our Australian clubs or societies would carry out some systematic competitions to test the laying qualities of the various breeds, and to ascertain how our Australian climate acts upon egg-production, for I am of opinion that the averages would be slightly different under the altered conditions. It might also be urged upon private individuals the usefulness of testing the laying powers of the one or more breeds they may possess. It would be necessary to keep all data as a guide for comparison, and if sent to me addressed, "J. W. M., Poultry-yard, *The Register* Office," I should take an interest in compiling the information so gained.

OVERGROUND WATER TANKS.

A Southern exchange says:—Not to be caught without a water supply next summer, many people are now proposing to construct wells and dams, while others are asking information about over-ground tanks. These latter are not common as yet, but those who have put them up say they are a great improvement on the under-ground tank, and find them cheaper to construct. The following particulars, supplied by one who has built them, embrace all the necessary information for building circular over-ground tanks. If the foundation is sound nothing further is required than to level the surface; if clay, excavate 1 foot deep; and if coarse gravel is obtainable, lay in 6 inches of concrete, either mixed with lime or cement, the latter for preference. The bricks must be made from clay, burned dark red, and not be porous. Tanks to 10 feet in diameter can be built with single-brick sides, or 4½ inches thick, up to 20 feet of 9-inch work, and it is not desirable to build them more than 12 feet high. The concrete having set, erect a piece of gaspipe, perfectly upright, in the centre of the proposed tank; bore a hole in one end of a batten, and put it on the pipe for a traverser, to give your circle and keep the work true and upright. For 9-inch walls lay one course of 14-inch work round the circle, letting it project 2½ inches outside the 9-inch work to give a good footing. Lay in a piece of galvanised gaspipe 1 inch in diameter, and 2 feet or 3 feet long on this course as an outlet-pipe. Start your walls, placing the bricks all lengthwise on stringers, breaking the joints a half-brick each course. one circle inside the other, about ½-inch between. See that the mortar is properly applied to the ends of the bricks, and grout well every course to fill any openings. Strike the outside, leaving the inside rough. Keep working round the wall, one course at a time till the required height is reached, and place an overflow pipe at the top. It does not require any batter or taper, and no hoop-iron. Lay in the bottom one course of bricks on the flat, and grout well. The whole is then to be cement-plastered inside—bottom as well as sides—about ½-inch thick, using clean sharp, but not coarse sand 3 parts, cement 1 part. When this has set, put on a thin coat of 1 to 1, and finish smooth. The mortar for building should be 3 or 4 parts sand to 1 of cement. The cement must be of the very best; if doubtful, have it tested. The whole work will be spoilt if any other than the best be used, and the sand clean and sharp; wash if necessary. A short standpipe and tap can be screwed on to the outlet-pipe, or it can be led with piping to the kitchen, or wherever the water may be required. If a little weeping takes place

at first, no danger of bursting need be feared, and it will take up in time. These tanks are not only cheaper but much more reliable than underground ones, and the water does not get hot in summer. In leading the water from the spouting, let it run through a piece of down-piping to the bottom of the tank; this freshens the water with every rain. A cover of boards or galvanised iron can be put over if desired. Any handy farm labourer can build one of these tanks in a few days.

HOW A BULLOCK FIGURES OUT IN AMERICA.

Taking a prime steer weighing 1,600 lb. before slaughter, the packing-house expert would figure his warm carcass at an average of about 62 per cent. or 992 lb.; at 960 lb. cold, or 60 per cent., and three days later in New York city at 15 lb. tare for shrinkage. This will land the dead carcass of the 1,600 lb. live steer at Manhattan market weighing 935 lb. to the butcher. For this prime beef at 6 cents per lb., live weight, the marketman pays the dealer 9½ cents at most by the carcass, or 88·38 dollars for the dressed steer. That is what it costs the butcher.

THE DETAILS OF THE COST.

The packer figures that this dead meat cost him as follows:—

	Dollars.
The beast in the stock yards at 6 cents per lb. stands him	96·00
Killing at per head in Chicago, including handling, refrigerating, icing cars, and such incidentals ...	1·50
Freight to New York is a fixed charge. The rate is 40 cents per 100 lb. This includes icing *en route* and amounts to	4·00
The carcass landed in New York costs	101·50
To this cost must be added the fixed cost of 48 cents per 100 lb. which the holding, handling, and selling of the meat by the concerns, or per agents, entail. This amounts to	4·49
The total cost of this carcass to this wholesale dealer is	105·99

There is left the offal and waste which go into the by-product. The prices realised for this as raw material, may be deducted from the total cost of the meat.

DEDUCTING THE OFFAL AS CREDIT.

The offal, or waste in dressing, is thus figured:—

	Dollars.
Hide, 91½ lb. The market value of hides is figured on the green skin after it is pulled, and before any further work is put on it. The present market for the average fresh-pulled green hide of all classes would be about 6½ cents; 91½ lb. hide at 6½ cents per lb.	5·95
Fat, 144 lb. at 3 cents per lb.	4·32
The blood and all of the balance of the offal is figured in at about 80 cents per 100 lb.; there being nearly 400 lb. remaining, it figures in at	4·00
The wholesale slaughterer receives for the waste in the green state as manufacturing stock...	14·27
The carcass delivered to the butcher cost	105·99
Less the price obtained for the offal	14·27
	91·72

The net cost of a 935 lb. carcass of beef landed in New York city at 6 cents per lb. live weight for the steer is 91·72 dollars.

This equals 9·59 dollars per hundred, or 9 59-100 cents per lb.; over $9\frac{1}{2}$ cents.

The general loss on a Texan or common grasser range steer is greater, as this grade of beast only dresses about 54 per cent. of its live weight into beef. Offal fetching a nominal price per lb. prorates a larger per cent. of cost back upon the beef.

Altogether it is pretty close work, and the present price of beef is under its actual cost price.—*National Provisioner.*

TO EXTERMINATE COCKROACHES.

A method of getting rid of cockroaches is described in the entomological bulletin of the United States Department of Agriculture, to which we referred a few weeks since. A mixture of one part of plaster of Paris with three to four parts of flour is placed in a saucer on the floor. Near at hand is a plate containing water, and both plate and saucer are supplied with a few bridges to facilitate access, whilst one or two thin slips of wood float on the water, and touch the margin of the plate. The insects readily eat the mixture of plaster and flour, and becoming thirsty they drink, with the result that the plaster sets and clogs the creatures internally, with fatal effect. This plan has been tried with considerable success at a locality in South Australia where cockroaches were very troublesome a few years ago, though few complaints are made about them now. The method is so simple that it might easily be given a trial in kitchens and other places infested by these objectionable creatures.

EXPORT OF EGGS FROM SOUTH AUSTRALIA.

During the past ten years the value of the eggs exported from South Australia was £381,103, or £108,728 more than the value of the butter exported during the same period.

AGRICULTURAL AND HORTICULTURAL SHOWS.

The Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may have been decided on.

The Markets.

AVERAGE TOP PRICES FOR MAY.

Article.		MAY. Top Prices.		
		£	s.	d.
Bacon	lb.	0	0	7
Bran	ton	6	9	0
Butter, First	lb.	0	0	$9\frac{3}{5}$
Butter, Second	,,	0	0	$6\frac{7}{10}$
Chaff, Mixed	ton	3	18	0
Chaff, Oaten	,,	4	16	0
Chaff, Lucerne	,,	4	0	0
Chaff, Wheaten	,,	3	4	0
Cheese	lb.	0	0	6
Flour	ton	8	6	0
Hay, Oaten	,,	5	10	0
Hay, Lucerne	,,	4	3	0
Honey	lb.	0	0	$1\frac{3}{5}$
Rice, Japan (Bond)	ton	15	0	0
Maize	bush.	0	3	5
Oats	,,	0	3	9
Pollard	ton	6	9	0
Potatoes	,,	5	8	0
Potatoes, Sweet	,,	1	14	6
Pumpkins	,,	1	11	0
Sugar, White	,,	17	8	0
Sugar, Yellow	,,	13	14	0
Sugar, Ration	,,	11	0	0
Wheat	bush.	0	3	$3\frac{4}{5}$
Onions	cwt.	0	5	$0\frac{3}{5}$
Hams	lb.	0	0	$9\frac{4}{5}$
Eggs	doz.	0	1	$6\frac{3}{10}$
Fowls	pair	0	3	$3\frac{3}{5}$
Geese	,,	0	5	6
Ducks, English	,,	0	3	$1\frac{1}{5}$
Ducks, Muscovy	,,	0	4	$2\frac{2}{5}$
Turkeys, Hens	,,	0	7	6
Turkeys, Gobblers	,,	0	12	$4\frac{4}{5}$

ENOGGERA SALES.

Article.	MAY. Top Prices.		
	£	s.	d.
Bullocks	7	14	6
Cows	5	1	6
Wethers, Merino	0	14	5
Ewes, Merino	0	11	$2\frac{1}{4}$
Wethers, C.B.	0	15	5
Ewes, C.B.	0	13	6
Lambs	0	12	3
Baconers	2	0	$7\frac{1}{2}$
Porkers	1	8	0
Slips	0	7	$6\frac{3}{4}$

Orchard Notes for July.

By ALBERT H. BENSON.

The pruning of all kinds of deciduous fruit trees should be completed during this month. All prunings should be gathered and burnt, and the trees should then receive a good winter spraying with the sulphur, lime, and salt wash. After pruning and spraying, the orchard should be ploughed, so as to bury all trash and weeds that have accumulated, as well as to sweeten the soil and break up any pan that may have been formed by summer cultivations.

Citrus trees, from which the fruit has been gathered, should also be gone over carefully; all dead branches, or branches with borers in them, should be cut out and burnt. The inside of the tree should be thoroughly well thinned out, care being taken not to open up the head too much. As a general rule, the pruning of citrus trees is greatly neglected in this colony, the trees being allowed to grow into a dense mass, which forms the best possible harbour for all kinds of scale insects and a breeding-ground for various fungus diseases. Such trees cannot be kept clean by spraying, as it is impossible to get the spraying material used on to all parts of the tree. On the other hand, when the inside of the tree is well thinned out, there is little harbour for pests, and those that are present can be reached by spraying. In the Orchard Notes for June, I recommended a dressing of sulphur, lime, and clay or fine flour, to be applied as a paint to the trunks and main branches of citrus and other fruit trees after they have been pruned; and I can only repeat what I then said, viz.:—That where San José, Greedy, Mussel, or Parlatoria scales of deciduous trees, and Red, White, Circular, Black, Mussel, or other scale insects, and fungus growth of all kinds of citrus trees are present, this method of treatment is even more efficacious than the sulphur, lime, and salt spray for deciduous trees, or the resin, soda, and fish-oil wash for citrus trees. Painting the trunks and main branches does not, however, do away with the necessity for spraying, as the smaller branches, twigs, and leaves can only be reached by means of the spray-pump. The best results are obtained by painting the large wood and spraying the rest of the tree. Planting can be continued throughout the month. Don't plant too deep; the depth at which the tree stood in the nursery row is the right depth to plant. Cut back hard when planting; don't be afraid that you will spoil your tree, as if you don't cut back hard you will never get a symmetrical, well-grown tree, and your failure to cut back will always tend to injure the future growth and vigour of the tree.

Don't plant rubbish, and only plant those trees that your soil and climate are adapted for. Remember that the climatic conditions of this colony, with the exception of the Stanthorpe district, are altogether different to that of the colder parts of the southern colonies, and that, therefore, we cannot grow the same fruits here, in our tropical and semi-tropical districts, that are grown successfully in the south. I wish to call attention of all fruitgrowers to this very important matter. I especially wish to warn fruitgrowers and intending fruitgrowers not to plant varieties that are unsuited to the climate, and advise all such to consult the Department of Agriculture as to the suitability or otherwise of the fruits they wish to plant, as I am certain that they will find it to their advantage to do so.

It costs just as much to prepare the land for and to plant, prune, and look after an inferior variety or a variety of fruit that is unsuitable to the climate, and from which no return of any value will ever be obtained, as it does to grow a variety that is suitable to the climate and that will produce superior fruit that will meet with a ready sale; therefore, no fruitgrower can afford to spend time and money growing unsuitable varieties, and the sooner that this is realised the better for the fruitgrowing industry of this colony.

Farm and Garden Notes for July.

FARM.—Now is the time to prepare the land for potatoes, maize, sugar-cane, tobacco, field carrots, mangel wurtzel, swedes, &c. Oats, barley, and vetches may be sown, and there is no better time for getting in lucerne seed. The pestiferous weeds have slacked off, and will not choke the young plants. The best soil for lucerne is a deep, calcareous loam. Depth of soil is essential, for the lucerne draws the greater part of its nourishment from below the surface, even to a depth of from 6 to 12 feet. Loosen the soil to a depth of 18 inches with the subsoil plough, but on no account bring the subsoil to the surface. Then bring the land to as fine a tilth as possible, so as to give the seed every chance of germinating. After sowing, run a light harrow or a brush harrow over the land. It will be quite sufficient to cover the seed. Sowing in drills is not recommended, because the weeds, at least such as are prolific in winter, will grow between the drills, and if wet weather sets in, especially such abnormal weather as was experienced in June last, the weeds will get ahead before they can be destroyed, and will choke the young plants. From 10 lb. to 12 lb. of seed is sufficient to sow per acre. In very early districts, potatoes, sugar-cane, and maize may be planted, but where late frosts occur we advise that sowing be deferred until all risk of the young plants being nipped is over.

In the far North rice may be planted. Cinnamon and kola-nut cuttings may be planted under glass. Harvest the coffee crop, paying attention to the remarks published in this issue of the *Journal* by Mr. Howard Newport. Yams not unearthed during June, should now be taken up. Tobacco must be gathered as it ripens.

KITCHEN GARDEN.—Make successional sowings of carrot, parsnip, broad beans, lettuce and other salads, peas, turnips, beet, leek, onions, &c. Plant asparagus and rhubarb, cabbage and cauliflower. The amateur gardener should be careful in sowing his own seeds. It is better to purchase from those who make seed-selling their business, than to risk sowings of seeds which usually in amateur gardening are the balance of the various crops, and consequently, as a rule, worthless. The drying westerly winds will now require to be met by frequent hoeing and watering. By keeping the surface soil in fine tilth by constant hoeing, much moisture is prevented from evaporating, and those gardeners who attend most assiduously to their work will reap a substantial benefit, where those who allow the soil to dry and cake will suffer grievous loss. Stake up your peas. Pinch off the tops of the broad beans. In some warm localities it will be quite safe to sow cucumbers, marrows, and squashes during the last week of the month, but do not sow French beans, dwarf or scarlet runners in cold situations. Get all the ground ready for spring crops. Plough or dig up any land intended to be sown in July and August, but leave it in the rough. If you harrow or pulverise the soil too long before sowing or planting, you not only encourage the growth of weeds but you deprive the soil to a great extent of the sweetening influences of the sun, rain, and air.

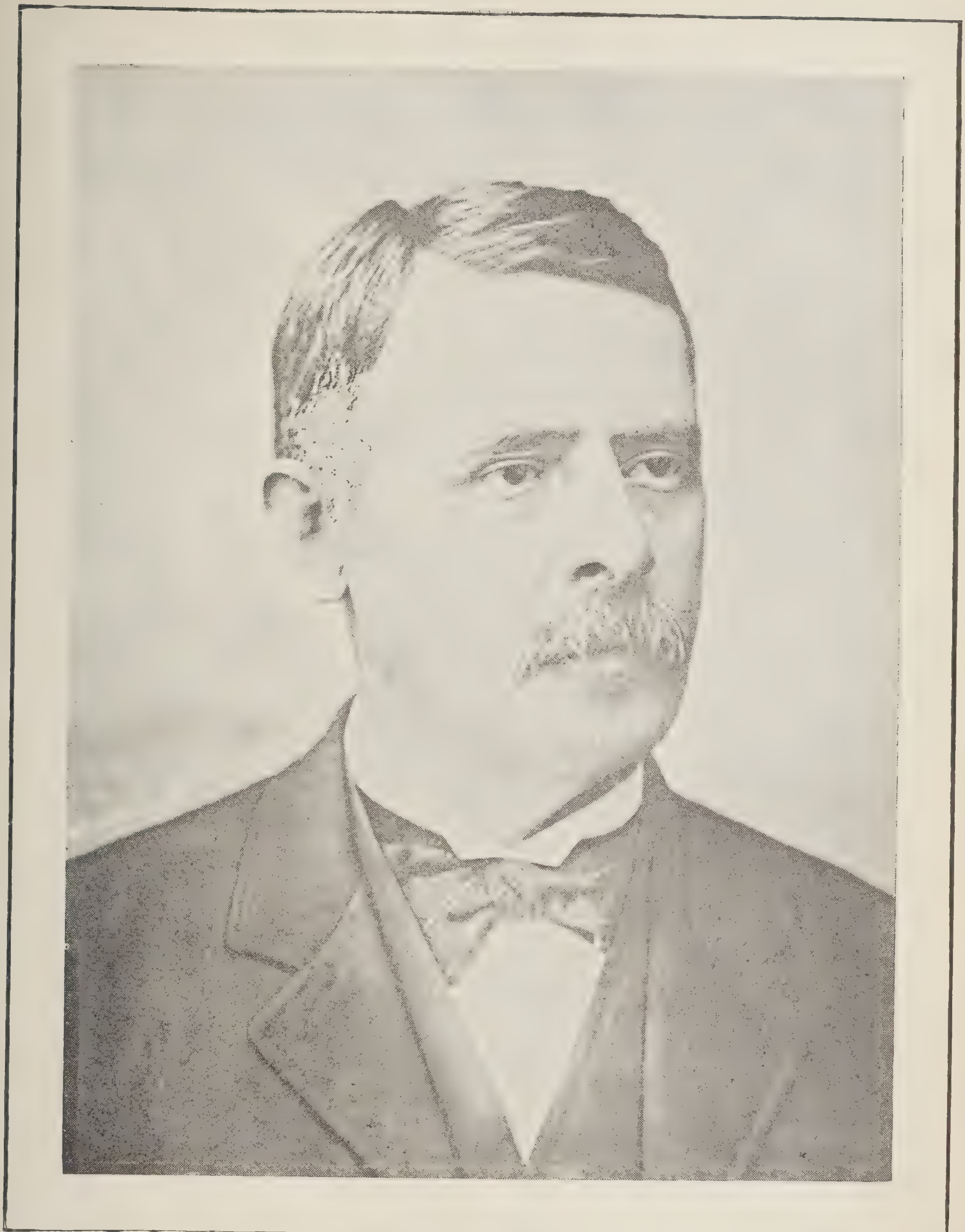


PHOTO. BY POULSEN.

The Hon. J. V. Chataway, M.L.A.,

SECRETARY FOR AGRICULTURE.

CHATAWAY, JAMES VINCENT, M L A. for Mackay, was born in September, 1852, and was educated at Winchester College Arrived in Australia in 1873. At the general elections of 1893, 1896, and 1899 was returned for the constituency of Mackay to the Legislative Assembly. On 2nd March, 1898, he was appointed Secretary for Agriculture; on 12th October, 1898, Secretary for Lands, and on 7th December, 1899, he was again appointed Secretary for Agriculture.

[*From Pugh's "Men of the Time."*]

Australia v. South Africa.

Now that there is a prospect of a termination of the war in South Africa, and that it appears clearly to be the intention of the British Government to place the Orange Free State and the Transvaal under British rule, the Australian nomadic instinct has begun once more to assert itself. From Victoria and New South Wales there appears to be a large exodus of adventurous spirits to the new colonies (for the Orange Free State has already been formally annexed by Great Britain under the name of the Orange River Colony), where they hope to better their condition either as mechanics, farmers, miners, or labourers. As it was in the early alluvial mining days in the various colonies of Australasia, when, if a report were spread that a new rich alluvial goldfield had been discovered, immediately hundreds of men abandoned claims, where they were doing moderately well, and rushed away on horseback, on foot, in drays, and even pushing wheelbarrows to the new Eldorado, not pausing to consider distance, climate, supply of provisions, &c., so it seems that to-day the Australian worker is inflamed with a desire to seek better fortune in our new colonies.

Before the mania for emigration to South Africa takes hold on the Queensland miner, farmer, and others, we should like them to pause and give heed to what is said by those who have been in that country for many years.

Let us consider the Orange River Colony, the area of which is 50,000 square miles. Like the adjoining parts of the central plateau, it is, says Mr. A. H Keane in the latest work on the Boer States, essentially a steppe (plain) land, level or undulating, covered for the most part with herbage, somewhat dry and in places even bare. Hence it is mainly a vast grazing ground, affording pasture to millions of merino and Cape sheep, goats, cattle, and horses, but so *ill-adapted for tillage* that scarcely one-hundredth part of the whole area is under cultivation. The rich agricultural tracts are mainly confined to the banks of the Caledon River, where the land under wheat is increasing, and where the vine and fruit trees also thrive.

But elsewhere, and especially towards the south-western frontier, the country presents an extremely dreary and even desolate aspect, and this character is maintained on both sides of the Orange River below the Caledon confluence. Thus, the extensive tract stretching from Kimberley for 150 miles across the river towards the De Aar railway junction *may* possibly contain vast underground treasures, but on the surface has little to show except a monotonous succession of rugged, waterless, and almost treeless plains, dotted with boulders, and here and there relieved by the so-called kopjes, weather-worn knolls or hills, seldom rising more than 600 or 700 feet above the surrounding land.

These kopjes are admirably adapted for defence, and, when manned, form a series of small citadels, and so were eminently suited to the peculiar style of warfare of the Boers. All the waters of the Orange River Colony flow into the Orange River, and are so carried to the Atlantic. But the tributaries of that river are something like many of our Queensland rivers inland. They look well on a map, but the thirsty traveller often finds them mere beds of sand.

Now a word about the Transvaal. This republic has an estimated area of 119,000 square miles. A high range of mountains from 5,000 to 6,000 feet high runs along its eastern boundary, and there are numerous central and south-western "rands" or hills, which, except in the cases of isolated peaks, do not rise

more than a few hundred feet above the tableland. This tableland, consisting of rolling downs, represents almost the whole of the Transvaal. The Limpopo or Crocodile River forms the northern boundary, and here the land falls to about from 2,000 to 2,500 feet above sea-level. This portion of the country, the Limpopo Valley, is extremely unhealthy, fevers of the African type being very prevalent. The country bordering the river is well-wooded, and affords splendid cover for the big game which has as yet escaped the bullets of the Boer and European hunters. The dreaded tzetze fly is also much in evidence here. Amongst the wild beasts may be mentioned the lion, leopard, hippopotamus, rhinoceros, and crocodiles. Along the whole course of the Limpopo there is a stretch of country, 40 miles wide, rendered uninhabitable to settlers, owing to the ravages of the tzetze fly amongst horse and other stock.

The great want of the two countries is water and rain, and the Western squatters of Queensland know too well by bitter experience what this means. It means that cultivation is impossible, and it means that watered and grass country must be available to which the starved-out flocks and herds of waterless regions can be driven to find sustenance. Without irrigation, agriculture must continue to hold a very subordinate place in the industries of both the Orange River and Transvaal colonies. Of minerals, there are vast deposits in the Transvaal; amongst them, gold ranks first. Next come copper, iron, lead, saltpetre, sulphur, coal, and diamonds. Only 5,000 or 6,000 acres of gold concessions have as yet been worked, so it would seem there is room for the prospector. Silver, copper, and lead have not been worked for the past six years.

Now touching the climate. Owing to the position of the great mountain ranges, the rains occur much as they do in our own colony. The country east of the range gets the greatest rainfall, and this becomes a more and more vanishing quantity as one travels towards the west. The soil is naturally fertile on the plateau south of the Zambesi, but is mostly parched in dry seasons. Tree growth is confined to willows, wild figs, and iron-wood, which grow in the neighbourhood of "spruits" or river valleys and "kloofs" or deep gorges.

Where cultivation can be carried on, good crops of cereals are raised, and tobacco, the vine, and European fruits succeed well. There are as yet only 50,000 acres of this immense territory under cultivation. Can the Queensland farmer find it profitable to enter on farming pursuits there? From what we have written about the climate, the rainfall, the sandy river-beds, wild beasts, the tzetze fly, to which must be added locusts and horse-sickness, the reply would obviously appear to be, "Certainly not."

For the sake of comparison, let us draw a picture of the first establishment of a farm in Queensland.

In the first place, the farmer has a choice of land from an area of over 600,000 square miles. He can elect to live in a tropical, semi-tropical, temperate, or cold part of this enormous territory. Nearly the whole of the coast lands are well wooded; whilst inland, in addition to vast rolling plains of exceptional richness, there are forests of magnificent timber to which the settler can help himself for the purposes of building, fencing, &c. From the coast to many miles inland he is certain of sufficient rainfall for his crops. The climate is very salubrious, fevers being rarely contracted in the bush, and they are rapidly disappearing before the axes and fires of the settlers. For 300 or 400 miles inland from the coast there is a plentiful supply of water, either in rivers, creeks, or lagoons. Everywhere, crops are produced all the year round; everywhere, almost, there is either a market close at hand or a railway line to take the farmers' produce to it. These railways extend in all directions—north, west, and south—from the various coastal cities. The settler, having selected his land, can camp on it with his family in a tent in perfect safety. There are

no wild beasts for him to fear. If his fire goes out at night, no prowling lion or hungry leopard springs upon him in the dark; no band of savages takes advantage of his defenceless condition to murder and plunder him. He can safely set to work, build his house of the bush timber, fence his land with the material at his hand, and set to work with the almost certainty of taking off his first crop within six months. No elephants or monkeys are here to trample down and carry off his corn or sugar-cane, or dig up his sweet potatoes for him. Here, he has perfect peace, a life of labour, but also a life full of comfort and enjoyment. He has no hordes of natives to do his work for him, and so does not yield himself up to a life of voluptuous idleness, a result which invariably happens in countries with a vast native population, as in parts of Asia, Africa, the Indies, and South Sea Islands. Here the farmer is able to work with his family and his farm hands, and it is only in the sugar districts that a certain amount of reliable black labour is necessary, although such labour is anything but what is called cheap labour.

Then take the question of roads and markets. The Queensland farmers are in almost every district in touch with a railway line. There are many large coastal cities, many large inland cities and towns in Queensland alone, where a good market exists for all the produce they can supply. In addition to these, they have the southern markets which can take large quantities of produce. How does the case stand in South Africa? There are few railways, few roads, and few markets. The distances between these market towns are enormous, unless in the older settlements in Cape Colony; and old settlers in Queensland will remember how, in the old days, the only means of carrying wool and other produce to the few towns on the coast were the lumbering bullock-dray or horse-wagon. Weeks and even months were spent in such travelling. Now, a glance at the map of the two South African colonies will show what long distances would have to be travelled by farmers settling, say, in the western portion of the Transvaal or in the central and north-eastern districts of the Orange River Colony. Still greater difficulties of transit must be encountered by settlers in Bechuanaland or in Rhodesia, where there are scarcely any market towns except Buluwayo and Salisbury in the latter, and Mafeking and Taungs in the former. Such being the outlook for transport and markets, how can the Australian farmer hope to better himself by pioneering in such a country even with land at from 1s. to 4s. per acre?

With minerals the same objections arise: want of water and want of railways. Why go to South Africa to prospect, when such magnificent fields as the Etheridge and many other auriferous districts of Queensland in the midst of white settlement, with good roads, timber, and good land, together with a fair rainfall, lie open to the prospector, and are capable of supporting large mining populations, and affording many openings for remunerative subsidiary industries?

No, we should recommend our Queensland farmers and miners, mechanics and labourers, to remember that it is "distance that lends enchantment to the view," and to also remember that not one of our colonies offers such excellent prospects to agricultural and mining settlers as does this splendid colony of Queensland with its excellent climate, its just laws, its British institutions, its freedom for all, its illimitable agricultural lands, its forests, rivers, and mines, its roads, railways, telegraphs, and its numerous cities and towns. Most of these advantages are yet in the womb of the future in the two South African colonies, and an immense amount of pioneering work will have to be done by the Australian who elects to abandon his comfortable home for the unsettled portions of the new colonies.

Agriculture.

QUEENSLAND SETTLERS' AND FARMERS' HOMES.

By FRED. WM. PEEK, Loganholme.

PART I.

Out upon the calf, I say,
Who turns with grumbling head away,
And quarrels with his feed of hay
Because it is not clover.
Give to me the happy mind,
That will ever seek and find
Something fair, and something kind,
All the wide world over.

There is a strange fascination to the newcomer or the settler, who for the first time faces the virgin scrubs or forests of this colony with the object of bringing under his control the climatic conditions that are of so varied a nature in this, the most resourceful of all the continental colonies of Australasia. The peculiar physical geography of this colony and its great variety of climates enable its settlers to choose for themselves to what branch of the agricultural industry they will devote their energy and labours—whether it be a branch requiring a temperate, or a sub-tropical, or a tropical climate. Such conditions can be obtained suitable for every variety and class of agriculture within the 2,250 miles of the coast line of Queensland, and they justly entitle this colony to be considered as holding the premier position in Australasia in the matter of agricultural production.

ROUGHING IT.

The general idea instilled into those persons taking up land is, that they have got to rough it for a certain time; that is, they have got to forego the pleasures and so-called luxuries of a town life, as in the case of new arrivals—erstwhile tenant farmers, who have left the older countries where every convenience was to be found on their farm holdings. These comfortable holdings they have left to come to this colony, bringing their savings with them, intending to obtain a piece of land which will be really their own, and on which they may make a home for themselves and their families. Although in the early days it was considered and advised by those competent to advise, that the selection of a piece of land should not be taken up too hurriedly, and that a little of what was termed "colonial experience" was very necessary to the future settler, such ideas have, so far as Queensland is concerned, gone with the past. Of course, those without capital or means would be foolish to think of immediately settling on the land with the expectation of making a living straight away, although I know of individual cases where some men have done so, but it has been by the sale of the valuable timber on their selections, which should and ought to have been conserved to the well-being of the colony, but which, I am sorry to state, was cut down ruthlessly and indiscriminately without any reservation for future requirements.

It is to those with a small amount of capital, and others who may be sons of our early settlers and farmers, that I desire to give a few impressions and practical hints in the manner of establishing farm homes for themselves.

The first thing to be considered is what branch of agriculture shall be chosen; let it be decided first whether sugar, fruit, wheat, or mixed farming is to be entered upon. The branch having once been decided on, let that be the main object of all future proceedings, and the first course should be to carefully select that portion of the colony, and some district in it, that is most likely, owing to its geographical and climatic conditions, to be favourable to future operations. Of course, the great principles which underlie success in the agricultural industry are the same everywhere, but there are peculiar features and capricious natures in the various soils which call for special treatment; and unless these matters are well weighed by the would-be selector and farmer, eventual failure must necessarily ensue, involving the loss of the labour and expenditure incurred, a labour and outlay which would in all probability have met with their due reward, if locality, climate, and soil had first been considered, and the advice of the Department of Agriculture obtained. I would like to add here, that Queensland is rapidly passing away from the experimental stage of its existence, when our old pioneers had to put up with various vicissitudes and troubles, with difficulties inseparable from having to find out by personally experimenting, and thus often meeting with failures. Such matters are now taken in hand by the Agricultural Department, who have experts in every branch of the industry, who advise the settler as to the selection of the land and on subsequent operations to the gathering of the crops. Their advice is at all times available, and that on every subject of interest to the intending settler.

Were I to particularise any one district as preferable to others, I might be thought to be prejudiced in favour of such district; yet there are portions of this colony where certain agricultural products can be safely recommended as likely to succeed better than in others. There is one industry, however—viz., "fruitgrowing"—which I think bids fair to be the most important, the most extensive, and one that can be safely entered into with every reasonable certainty of a remunerative return, especially as it is not dependent on the employment of machinery to manufacture it and prepare it for sale or consumption. The sugar and wheat industries, although also very remunerative to the growers in this colony, have not the same extensive range of climate; and, consequently, only certain portions of the colony can be advocated as being suitable areas for such products, although sugar has been and is still being grown successfully from the Mosman River and the Proserpine and Mulgrave districts in the Far North to the Logan and Nerang districts in the Southern portion of the colony, where the lands on the coast are chiefly availed of for such industry. The production of wheat is almost confined mainly to the tablelands above the Main Range, known as the Darling Downs, and to the cool tablelands of the Central districts, where (judging from a recent visit) the climate, rainfall, and soil are all that the wheatgrower can possibly desire The rich Downs lands in magnificent stretches of thousands of acres are covered with rich grasses; there are no scrubs or forests of timber to contend with and to subdue. They only await the plough and the energy of man to become a considerable factor in the future prosperity and wealth of Queensland. On the matter of mixed farming, which is coming more into fashion, and which is also strongly advocated by those engaged in such pursuits, a great deal may be written in its favour, especially where farmers are situated in close proximity to towns of any size or importance, as a local market can be readily obtained for most products; and I would strongly advocate the inclusion of dairying and pig-raising as an adjunct to farming of any kind, and to those near towns the inclusion of an area set apart as a market garden, since the manure from the piggeries, stockyard, fowl-houses, and stables is most valuable, and returns its value many times more quickly if used to make up and enrich a market garden than if thrown broadcast on acres of farm land, which can be treated more evenly and better by the purchase of active chemical fertilisers that would be more nutritious and more expeditious in supplying, in a special manner, the deficiencies in the composition of certain soils which ordinary stable and farmyard manure cannot always supply.

BULK-HANDLING OF GRAIN IN AUSTRALIA.

In all great grain-producing countries, and at many ports of entry, the handling of grain has been facilitated, and loading and unloading are rapidly carried on by means of grain elevators. Amongst those interested in the introduction of elevators into Australia there are two factions—those for and those against. So far as our present production of wheat and maize is concerned, we should give our vote with the "againsts." Elevators are intended to deal with enormous quantities of grain, such as are produced by Russia, the United States, and Argentina. If we had 120,000,000 bushels of wheat to ship, as had the United States and Canada last season, or were we to raise the same quantity as the States raised, 550,000,000 bushels, which would necessitate an expenditure of over £2,000,000 sterling for bags, we should decidedly be in favour of bulk shipments and of the establishment of elevators, but our wheat crop at present is a variable quantity. One year we produce 1,000,000 bushels, the next 600,000 bushels. Until we can be certain of producing a minimum of from 10 to 20 million bushels, the expenditure on grain elevators would not be justified. The machinery such as is employed at Duluth would put 10,000,000 bushels on board ship in six days, working night and day. Then it would be idle for twelve months.

On this subject we print an article from *Farm and Dairy*, which fairly places the *pros* and *cons* before its readers:—

By "RUSTPROOF."

Handling grain in bulk, cleaning and grading grain are not all one and the same thing. The two last named are quite independent of the first, and of one another.

Farmers could, with advantage, purchase cleaning machines on co-operative principles, and erect them at convenient centres for general use.

If a grain elevator were erected at Sydney at a cost of £250,000, and it would not cost one penny less, the Board for Exports have £300,000 voted for the purpose, then the Government would have to get £10,000 back annually in order to pay interest on the borrowed money, to say nothing of management. That alone would mean a charge of 1d. per bushel if 2,400,000 bushels passed through annually.

All the wheat handled in bulk would have to be shipped to ports where there are discharging elevators—which means London, Liverpool, or Manchester—otherwise the grain would have to be re-bagged at the other end and no saving effected.

So far this year New South Wales has shipped less than 100,000 bushels of wheat to the United Kingdom.

Shipowners would charge a higher freight for a cargo of wheat in bulk than in bags on account of the alterations they would be obliged to make to their vessels according to law. The underwriters would also charge a higher premium for insurance on account of the risk of the carge "shifting" under heavy seas.

There is no such thing possible as shipping a full cargo in bulk. Such would be illegal. The Merchants Shipping Act provides that only three-fourths of the wheat can lawfully be shipped in bulk, one-fourth being in bags.

Cargoes of wheat are usually shipped "for orders." That is they call at a certain port and get instructions as to their final destination, the wheat being sold during transit. Often 6d. or 9d. per quarter more can be secured for a "handy" cargo for some port, such as, say, Cork. Under the bulk system this would be impossible, as wheat could only be shipped to ports provided with elevators for discharging.

Where wheat is shipped in bulk, the buyer stipulates in his contract that seawater damage to remain for seller's account. Should then the wheat be damaged *en route*, the seller and not the buyer loses, even though the wheat be sold "to arrive."

The insurance people object to bulk cargoes of wheat, and they hold the key to the position.

When farmers understand what handling wheat in bulk means, they, too, will object.

The millers are not favourably disposed to the elevator system, as it will entail considerable and expensive alterations to their plants.

No wheat is shipped from San Francisco in bulk, as the underwriters raise objections, and will not insure the cargoes.

Wheat shipped in bulk is liable to sweat and become heated. Many cargoes from Argentine arrived in London in this condition, and were practically worthless.

If wheat is to be shipped in bulk, farmers will have to ship on their own account, as shippers will not take the risk. It is doubtful whether banks would advance against such cargoes. They would certainly not unless they were fully insured.

Dr. Cobb advocated the shipment of wheat in bulk some years ago in the *Agricultural Gazette*. He has had to make his recent experience fit in with his pre-conceived notions or eat his former words—which is not pleasant for a consistent man to do.

The Board for Exports advocates the erection of a terminal elevator at Darling Island. Dr. Cobb advocates the erection of 100 to 200 smaller country elevators. Who is right? Not both!

Mr. Mathieson, the Victorian Railway Commissioner, has sailed for America to inquire into the elevator system in that country. It has been said that the object of the Government in sending Mr. Mathieson is to block the bulk-handling idea. The Commissioner says, however, "That if it is found the elevators will enable him to discharge his trucks at the rate of, say, ten in five minutes, their introduction would be the best thing that could happen to the department." There is, therefore, no reason why he should be opposed to the proposal if the farmers will give a guarantee that when the elevators are erected they will use them. "If," said Mr. Mathieson, "I advised the erection of these machines, and then it was discovered that the farmers would not use them, they would turn out to be a monument to my discredit, and that of all those connected with them."

Under the elevator system Jones, with good wheat, will have to agree to mix his wheat with Brown's bad wheat. Of course, Jones will be told that he will get a better price by helping to level up the quality of Brown's rubbish, but he will be hard to persuade of this fact.

By "ELEVATOR-BUCKET."

This is what Mr. J. M. Sinclair says on the subject in his report: "If we want to avail ourselves of the wonderful economy of bulk-handling of grain we must not seek to build up imaginary difficulties, but make every effort to overcome the small ones that exist. In every other direction we are a prosperous people. Keeping ourselves well abreast of the world in almost every phase of modern development, and the introduction of the elevator system and bulk-handling of our grain should next command the attention and united effort of farmers, millers, shippers, and the Government."

The consistent and persistent opposition to the elevator system on the part of millers and shippers naturally leads to the conclusion that it does not suit them.

Why does the bulk system not suit the miller? Is it on account of his not getting bags thrown in?

What has the shipper against bulk-handling? Wheat will still have to be shipped.

Fewer bags will be necessary under the bulk system of handling grain. Bags cost money.

During 1898—we have not the figures for 1899 available—bags and sacks cost Australian farmers no less than £690,695, with freight inland added. Last year the bag bill must have been even larger, the price of jute in Calcutta being higher.

If so many difficulties arise regarding shipping and insurance matters in regard to bulk cargoes, how do they manage in North America and in Argentina? Can some of our anti-bulk-handling friends answer that?

Bulk handling of wheat would do away with the necessity of carting the grain through the streets of Sydney at a cost of ½d. per bushel to the farmer.

While the wheat is being bulked it can also be cleaned and graded—another decided advantage.

When once bulk-handling of wheat is introduced and gets into good working order, then bulk-handling of maize can be thought of.

Some day Australia will probably have a surplus of maize. Probably New South Wales will lead the way in this respect. Competition with Argentina, which country had a surplus of 1,791,000 tons last year, and the United States with an even bigger surplus still, will be very severe. They handle cheaply in bulk, we expensively in bags. Under such circumstances who would survive?

During the first thirty-seven weeks of the present season the United States and Canada shipped between them 120,080,000 bushels of wheat to Europe. This would not have been possible under the bag system. An expenditure of over £750,000 would have been incurred for bags alone.

Elevators are being erected in Russia by the Government in order to encourage wheatgrowers.

Several new elevators have recently been erected in England for discharging grain, and it will not be long before every important port in the empire will have facilities for handling its grain in bulk.

No one expects the bulk system to pay for itself when it is first introduced. Just as well might a new railway line designed to open up new country be expected to pay. They both return handsome interest in the end.

Competition between the insurance companies is so severe that if one does not like to cover a cargo of bulk grain, another will be only too glad to do so.

It is ridiculous to say that we must not handle grain in bulk because Japan, Queensland, Noumea, and other places to which we ship wheat have no elevators to discharge the grain. Our chief market is Great Britain. If we had 10,000,000 bushels for export, probably 9,000,000 bushels would find its way up the Thames.

Are we to wait till we grow 50,000,000 bushels of wheat and then think of elevators, or are we to encourage wheatgrowing through having elevators now so that some day we may produce 50,000,000 bushels of wheat? Under the bag system such a crop would be next to impossible. Our railways would be chock-a-block, and we generally wouldn't know where we were.

If we had 50,000,000 bushels of wheat for export, elevators would enable us to handle, grade, and ship our wheat more promptly. They would also save bags, and generally would be worth discussing anyway. The United States had twice as much as that before elevators were dreamt of. Last year the United States had a crop of 550,000,000 bushels.

Interviewed recently, Mr. C. H. Campbell, of Dalgety and Co., Limited, Melbourne, said:—"As far as merchants and grain brokers were concerned, the system of shipping in bulk would be an ideal one. The quantity of wheat exported was now so small that he doubted very much whether the expenditure would be warranted. Of course the larger the quantity handled the less the cost of handling would be. But supposing that some of the natural difficulties were overcome, the shipping and insurance question would be almost insuperable, and both underwriters and shipowners would be opposed to the system on account of the expense."

At Duluth (U.S.A.), on 30th May, last year, 195,000 bushels of wheat were loaded into the steamer "Empress City" in three hours and five minutes. This quantity could not be loaded with bags under the most favourable circumstances under four or five days; it would very likely take a fortnight in Sydney. Every day a vessel is waiting for her cargo costs from £20 to £50, according to her size.

The producer pays for the time lost in loading a vessel with bags.

THE PLOUGHMAN'S DAY'S MARCH.

Probably not one ploughman in a hundred knows how many miles he walks during a day's ploughing. He naturally does not think about it. His whole attention is concentrated on his work, on making a straight furrow, and on easing his horses as much as possible. Still it is interesting to consider the number of unnecessary steps which are taken on a farm in various ways. The *Pacific Rural Press* gives an instance of this. A man ploughed $2\frac{1}{4}$ acres in ten hours. His employer, a man of sixty-seven years of age, took the trouble to calculate the number of miles the man had walked in performing the work, and the weight of shoe leather he had lifted at the same time.

He says: After the work was finished, by very carefully counting the number of furrows, and then taking the average number of steps he took in turning one furrow the length of the field (566 feet), as well as the average length of each step, I ascertained almost exactly how many miles he had travelled in ploughing the field, not including the distance travelled in turning at the ends, which was no small item in the course of the day. He wore ordinary work shoes weighing $3\frac{1}{2}$ lb. Many men I know wear much heavier ones, or boots, as the case may be, while some wear lighter ones. By multiplying the number of steps he took during the day by the weight of one shoe, I found that he had actually lifted over 32 tons of shoe leather, to say nothing of the extra amount of dirt which always adheres more or less to one's shoes while ploughing, especially on adobe land, and that he travelled at least $18\frac{1}{2}$ miles. This young man was a great worker, and with his 12-inch plough and two strong, young horses ploughed much more than a great majority of men would have done. It is not to be wondered at, then, that old men like myself get so completely tired out in even ploughing one-half the amount that this young man did, as they would have to travel $9\frac{1}{4}$ miles, and lift over 16 tons of shoe leather, providing their shoes were as heavy as his were.

The same employer states that in ten years he actually travelled about 1,500 miles, which occupied a little over 182 days of his time (counting ten hours a day), in order to water his horse and cow three times a day, notwithstanding the fact that his watering-trough was only 180 feet from his barn. He further stated that he bought some inch pipe, costing only 7 dollars 50 cents, which connected his trough at the pump to another one in his cowyard, and thereby saved not only this unnecessary travelling and valuable time, but that he soon found that his cow gave more milk by having free access to pure, fresh water, which in the summer months was many times a day.

The remedy he recommends for the lessening of the lifting of shoe leather and soil is a simple one. The great majority of farmers wear too heavy boots in their general work on the farm, but more especially while ploughing, harrowing, and cultivating, where so much travelling is required. He finds it absolutely necessary to dispense with as much surplus shoe leather as possible, in order to travel the distance required (over $8\frac{1}{4}$ miles) in ploughing even an acre of land in one day. The conclusion he arrives at is, to avoid wearing heavy boots, especially those with soles full of large round-headed nails.

A GOOD FLEECE.

WHAT CONSTITUTES IT.

What sheepman, either at home or in the colonies, does not believe in a good fleece of wool to enshrine the carcass of the animal? Go where you will, the goal of the "up-to-date" sheepman is, "good wool and plenty of it," and especially this to form the companion of a good mutton carcass. Some Yankee sheep-breeders have conceived the idea of evolving a merino to still continue to grow all the long-established qualities found in merino wool, and at the same

time to secure such an improved carcass that the accomplished and expert epicures of America and England will pronounce to possess all the well-known qualities of cross-bred mutton. We can only say that we wait with interest the results of the experiment, and, if successful, the name of the breeders will pass down to posterity with all the splendour worthy of a modern Bakewell. In the meantime, let us content ourselves with inquiring as to what should characterise a good fleece of wool.

In England, until but a very short time ago, our leading sheep-breeders were wont to sacrifice wool to meat, but with the foreign customer being now the largest buyer of pedigree sheep, that idea has, to some extent, been set on one side, and to suit the foreign demand it is now admitted that the modern sheep must also be a good wool-producer, notwithstanding its relatively low price. We have always maintained that it is essential that a mutton sheep should have a good fleece as well as a good carcass, and this combination is both practicable and profitable. It is now no longer regarded necessary to grow one sheep for a fleece, another for a carcass, and another for a lamb. The intelligent flock-master tries as far as practicable to combine them all in one class. Some of the best mutton sheep are producing as profitable fleeces as those kept exclusively for wool, and their lambs are decidedly superior from a commercial standpoint. One of the first essentials in a good fleece is

COMPACTNESS, OR DENSITY.

This characteristic not only assumes a better yield of wool, but it affords better protection against storm, and indicates a hardier animal better able to withstand exposure. A close, even dense fleece, with no breaks, should cover all parts of the body, including the head, limbs, and under parts. The tendency in improvement of the wool-producing quality of modern breeds has been towards carrying the fleece more completely over the head, face, limbs, and lower line. The advantage is not so much on the increased yield of wool grown on these parts, as that is of little consequence, but in the accompanying tendency of a larger and better yield of wool on other parts. A barefaced and bare-legged sheep is always a relatively light shearer, and, in contrast to this, the sheep woolled from "the eyes to the toes" always yields a heavy fleece, and the wool is generally of better quality than from those having a scanty covering.

FINENESS, LENGTH, AND STRENGTH

of staple are essential qualities in a good fleece that should have prominent consideration in the selection of breeding stocks, as these characteristics largely determine the market value. Neglect, or undue exposure of the flock, a period of sickness, or anything that induces unthrift and impaired vitality, invariably results in diminishing both the length and strength of the fibre. Softness and pliancy are, to a considerable extent, due to the secretions of the skin. A clear pink or yellowish skin is an indication of a good quality and well-grown staple of wool, while a pale or bluish skin is generally accompanied by an inferior fleece. The yolk is the oily secretion which gives colour, softness, pliancy, and lustre to the fleece. The composition of the yolk consists of a soapy or fatty matter, principally animal oil and potash, which promotes the growth of the fleece and prevents friction, wearing of the fibres, and cotting. Good feeding, shelter, and care promote liberal secretion of the yolk, while undue exposure and unsuitable soils result in injury to the wool by diminishing the yolk. The secretions are always more abundant under high temperature; hence "blanketing" and confinement in close, warm quarters will stimulate the production and ensure a finer fibre, and generally a better grown staple. A liberal secretion of yolk is favourable to the production of a good fleece, but the yolk should be clear and transparent, and not too thick and gummy. In addition to these features, a fleece should possess the properties of evenness and uniformity—that is, covering, density, and quality.—Woolman, in the *Farmer & Stockbreeder.*

REPORT ON WORK CARRIED OUT AT THE QUEENSLAND AGRICULTURAL COLLEGE.

JUNE, 1900.

A great deal of work has been done on the farm during the month. The rainfall, amounting to 1·52 inches, delayed operations somewhat. On the 20th ·86 inches were recorded. These conditions, however, were favourable during the first week for sowing eleven acres of land, formerly under cow pea, with Belatourka wheat, two acres of which were treated with fertilisers and one acre with lime.

Five acres of rye, seven acres of malting barley, and four acres of oats were sown in the 40-acre block. The climatic conditions were also favourable during the third week, when fourteen acres were sown with malting barley in the creek paddock.

The land for the stud wheats was again cultivated, and at the close of the month 194 varieties of wheat were planted. These comprise:—

1. Egyptian
2. Sicilian Barbe
3. Forelia
4. Mica
5. Medeah
6. Egyptian C 1
7. ,, A 1
8. ,, A 2
9. Young's Bearded
10. Paros
11. Atlanti
12. Banater
13. Cretan
14. Belatourka
15. Missogen
16. Bearded Club
17. Pugh's R. R.
18. Salvator
19. Algerian
20. White-eared Mummy
21. Brown ,, ,,
22. Poland
23. Diche Mediterranean
24. Hindustan
25. Brogan's Red and White
26. Australian Bearded Port Germain
27. Early Japanese
28. Rudy
29. Lazistan
30. Russian Shelton
31. Bearded Monarch
32. Australian Amber
33. Beal
34. Early Baart
35. Early Bearded
36. Bearded Velvet
37. Cone Rivet
38. Basalt
39. White Tuscan
40. Frames Early
41. Californian
42. White Naples
43. White Lammas (Young)
44. Australian Talavera
45. Talavera de Bellevue
46. Mammoth
47. Frampton
48. Blount's Fife
49. Small's O K
50. Anerson's R. R.
51. Russian
52. Scotch Fife
53. Indian Y
54. Indian D
55. Battlefield
56. Trap
57. Pringle's No. 5
58. Australian R. R.
59. Leake's Defiance
60. Pringle's ,,
61. Defiance
62. Emerald
63. Budd's Early
64. Allora Spring
65. Odessa Sans Barbe
66. Australian Wonder
67. Marshall's No. 3
68. ,, ,, 8
69. ,, ,, 10
70. Ward's Prolific
71. Hercules
72. Ward's White
73. Marshall's No. 5
74. Robins R. R.
75. Odessa
76. F 1
77. Deception Yandilla Strain
78. 66 D Farrar's Old Strain
79. Ibex ,, ,, ,,
80. R ,, ,, ,,
81. R I ,, ,, ,,
82. Best Strain ,, ,,
83. C D 1 85 ,, ,,

84. 84 B Y Farrar's Old Strain
85. B Y 86 A 1 ,, ,,
86. 85 B 3 88 A 1 ,,
87. 85 A 1 B 1 ,, ,,
88. 85 A B ,, ,,
89. 86 Y ,, ,,
90. 85 D 2 ,, ,,
91. 84 C J D ,, ,,
92. 84 C J D 2 ,, ,,
93. Yandilla No. 3
94. Eden No. 1
95. Improved Yandilla (Indian)
96. Armstrong Selected
97. Tilley's Sport
98. Silver King
99. A Farrar's New Strain
100. A 1 ,, ,,
101. A 2 ,, ,,
102. B ,, ,,
103. B A ,, ,,
104. B 1 A ,, ,,
105. B 2 ,, ,,
106. B 2 A ,, ,,
107. B 3 ,, ,,
108. B 3 A ,, ,,
109. B 4 ,, ,,
110. D 4 A ,, ,,
111. C ,, ,,
112. C 1 ,, ,,
113. C 2 ,, ,,
114. C 2 A ,, ,,
115. C 3 ,, ,,
116. C 3 A ,, ,,
117. D ,, ,,
118. D 1 ,, ,,
119. D 2 ,, ,,
120. D 3 ,, ,,
121. D 4 ,, ,,
122. E ,, ,,
123. E 1 ,, ,,
124. E 2 ,, ,,
125. F 1 ,, ,,
126. F 2 ,, ,,
127. G ,, ,,
128. G A ,, ,,
129. G 1 ,, ,,
130. G 2 ,, ,,
131. H ,, ,,
132. H 1 ,, ,,
133. H 2 ,, ,,
134. I ,, ,,
135. I 1 ,, ,,
136. J ,, ,,
137. J 1 ,, ,,
138. J 2 ,, ,,
139. N ,, ,,
140. N 1 ,, ,,
141. Q Farrar's New Strain
142. Q 1 ,, ,,
143. Q 2 ,, ,,
144. Q 3 ,, ,,
145. R ,, ,,
146. S 1 ,, ,,
147. T ,, ,,
148. T 1 ,, ,,
149. U ,, ,,
150. U 1 ,, ,,
151. V 1 ,, ,,
152. Y ,, ,,
153. Y 1 ,, ,,
154. C C ,, ,,
155. C C 1 ,, ,,
156. D D ,, ,,
157. D D 1 ,, ,,
158. E E ,, ,,
159. F F ,, ,,
160. G G ,, ,,
161. H H ,, ,,
162. I I ,, ,,
163. J J ,, ,,
164. M M ,, ,,
165. N N ,, ,,
166. N N A ,, ,,
167. P P ,, ,,
168. Q Q ,, ,,
169. R R ,, ,,
170. T T ,, ,,
171. V V ,, ,,
172. X X ,, ,,
173. Y Y ,, ,,
174. Z Z ,, ,,
175. A A A ,, ,,
176. B B B ,, ,,
177. C C C ,, ,,
178. D D D ,, ,,
179. E E E ,, ,,
180. F F F ,, ,,
181. Belatourka
182. Improved Allora Spring
183. Leak's Rust Resistant
184. Smith's Nonpariel
185. Leakrigg
186. 178 Cretan
187. 380 Sweetheart
188. 12 Paros
189. 122 Indian F.
190. 120 B Farrar's Gatton Pedigree 102 C 2
191. 266 Amethyst
192. 383 Comeback
193. 391 Hayricks
194. Yandilla
195. Gatton 65 X Y
196. Crown Wheat.

The winter supply of ensilage has been increased by the filling up of the third silo, which contains 90 tons, making a total of 175 tons of ensilage in the three silos.

The results of the experimental plots of potatoes are to hand (see *Queensland Agricultural Journal*, May, 1900, page 351).

No. of Plot.	Large Potatoes.			Small Potatoes.			Total Yield. Per ¼ Acre.		
	Cwt.	qr.	lb.	Cwt.	qr.	lb.	Cwt.	qr.	lb.
1	4	2	19	0	3	0	5	1	19
2	7	0	4	1	2	10	8	2	14
3	6	0	20	1	1	21	7	2	13
4	6	2	4	1	1	12	7	3	16
5	7	0	21	1	1	7	8	2	0
6	6	1	0	1	3	5	8	0	5
7	4	1	11	1	1	11	5	2	22
8	4	1	0	1	1	17	5	2	17
9	1	1	14	0	3	22	2	1	8
10	2	3	14	1	1	14	4	1	0

The results have been interfered with by irregular germination of seed, &c.; accordingly it would be futile to conclude that the phosphates are useless, or that the potash salts alone account for the increase of yield in plots 2, 4, and 5. Plot 7 was unmanured, and as the basis of comparison it shows generally that very little has been gained.

The double and treble furrow ploughs were working continuously during the month, and gave every satisfaction. The root crops were thinned out, and are looking remarkably well. (See *Q.A.J.*, June, 1900, p. 458.)

The wheat experiments (*Q.A.J.*, p. 457) promise to yield well.

In the mechanical department good progress has been made. The large hayshed referred to in the last issue of the *Journal* was being erected, and approaching completion. The old shelter stables were removed, and various repairs effected. The men's quarters were enlarged. The new cheese-room was erected, its dimensions being 15 feet by 12 feet inside. The walls are double lined. Insulation is effected by intervening layers of sawdust and ruberoid. The temperature of the room will be much lower than the external temperature. A counter-shaft was fixed in the barn, 20 feet in length and 2 inches in diameter. It transmits the power to four machines—viz., a corn-sheller, a grinding-mill, which grinds cobs and corn at the same time, a pumpkin-slicer, and a chaffcutter

The asphalt paths between the various buildings were repaired.

The electric lighting of the various buildings was commenced by Mr. L'Estrange, the manager for the firm Barton and White, of the Brisbane Electric Supply Company, and will probably be completed in August. The power is obtained from the 8-horse power engine and 14-horse power boiler at the dairy, where the dynamo will be fixed. The current will be transmitted by an overhead cable. The pressure required will be 110 to 120 volts. A bare copper cable conveys the current, and wires lead into each building. The wires have been insulated in the building. The wiring is of a new type, consisting of twin copper wires insulated with paper and a lead cover. The fittings are of the newest pattern—the pendent cords being of vulcanised rubber. Each room is fitted with one light at least, and has one or more controlling switches (two switches for eight lights). Each building is provided with a main double pole switch, and double pole cut out, so that in case of any accident the current may be completely cut off automatically from that building. Each light and each group of lights is protected by a fusible cut-out. The circuits are divided into three—one going to the stables, another to the principal's residence, the main building and dormitory A, and the third to dormitories B and C, the dining-hall, kitchen and the chemical laboratory. They are controlled by three separate switches, and cut-outs in the dairy. On the switch-board are the anemometer and the voltameter, the former measuring the current and the latter the pressure. It is estimated that 150 for lights, each equal to 16-candle power, will be distributed uniformly to the various

buildings, and that generally not more than two-thirds of the load will be in request, and that therefore the engine will be quite able to do the work.

The dairy herd provided 44 milking cows, including 8 Ayrshires, 6 Jerseys, 10 Shorthorns, 17 Grade, 1 South Coast, and 2 Holsteins. During the month 1,683 gallons of milk were treated, and yielded 657 lb. of butter.

The increase for the month was 1 male Shorthorn.

Twenty-six head of cattle were sold. The pure-bred milkers were rugged since the middle of June, and all the young male stock were housed and fed. These include 13 young bulls which are to be sold next August after appearing at the Exhibition.

Three Berkshire boars and 1 Berkshire sow were sold. There were on hand—young stock, for sale, 19 Berkshire boars and 34 Berkshire gilts; 10 Middle York weaners, and 6 Tamworth suckers. The pigs are at present fed on maize and pumpkins: the young pedigreed stock are allowed a little pollard.

In the orchard pruning was begun during the month; 2,620 cauliflower and 2,100 cabbage plants were transplanted. A large collection of radishes, comprising 10 new varieties, are just appearing above ground. These include the Giant Russian, Chinese White Giant, Striped Turnip Radish, Long Scarlet, White Turnip, Scarlet Turnip, French Breakfast, Ne Plus Ultra. The asparagus beds were cut and ploughed. The sweet potato and the lettuce suffered from the frost. The planting of camphor laurels and pepper trees was continued during the month. The newly introduced varieties of strawberry referred to in the last issue were just appearing to grow. The beans, peas, beet, turnips, and parsnips were flourishing, and forwarded in large quantities to market; the Yellow Aberdeen Turnip especially was an excellent specimen.

EXTRACT FROM THE MONTHLY REPORT FOR JUNE OF THE BIGGENDEN STATE FARM.

A great part of our work during June has consisted in preparing exhibits for the Biggenden and Maryborough shows, and also samples of the crops grown here for the Agricultural Museum of Philadelphia, in the United States of America.

We have also done some subsoiling and ploughing, and kept clean the growing crops.

The weather has been mild and pleasant for this time of the year, and all winter crops have made a fair progress. As soon as vine and fruit trees arrive, we are now ready to extend the vineyard and to plant the orchard, for both of which the land is in good heart and tilth.

AMOUNT OF FARM AND GARDEN SEEDS REQUIRED PER ACRE.

It may be of advantage to farmers who have only lately settled on the land, and particularly to some who may have entered on the business for the first time in Queensland, to know how much seed to purchase for sowing or planting various crops. Although there are certain crops which may practically be sown and raised all the year round in this favoured climate, yet the regular seasons for most crops are quite as clearly defined as they are in other colder or hotter countries. Some modification of the times for sowing and of the amount of seed to sow will have to be made in different parts of the colony, owing to the wide range of temperature and rainfall, and to the variety of soils and their aspect. But, as a general rule, the following will be found fairly correct, the quantities in all cases being per acre:—Barley, broadcast, 1 to 1½ bushels; drilled, ½ bushel. Beans (broad), drilled, 1½ bushels; (French), 1½ bushels; (horse), 2 bushels. Beet (drilled), 5 lb. Buckwheat, broadcast, 1 to 2 bushels. Cabbage

(field), in seed beds, 2 lb. Carrots, drilled, 5 to 7 lb. Clover, broadcast, 12 to 20 lb. Grasses, prairie, 1 bushel; Italian rye, 4 bushels; perennial rye, 2 bushels; rib, ½ bushel; couch, ½ bushel; permanent mixed pasture, 3 bushels; imphee, 20 lb.; kohl-rabi, drilled, 2½ lb. Lucerne, broadcast, 20 lb.; drilled, 10 lb. Maize, broadcast, 3 bushels; drilled, ½ bushel. Mangolds, drilled, 5 to 6 lb. Millet, broadcast, 1 bushel. Oats, broadcast, 2 bushels. Onions, broadcast, 5 lb.; drilled for setts, 20 lb. Panicum, broadcast, 20 lb. Parsnips, drilled, 8 to 10 lb. Peas, broadcast, 3½ bushels; drilled, 2 bushels. Potatoes, 14 cwt. of cut setts; if planted with the American potato planter, 10 cwt. Rye for grain, broadcast, ¾ bushel. If for saddlers' use, 1½ bushels. Sorghum for grain in drills 10 lb., broadcast for green fodder 20 lb. Swedes, 3 lb. to 4 lb. Turnips, globe and yellow, drilled, 2 lb. Vetches, broadcast, 3 bushels. Wheat, broadcast, 1 to 1½ bushels; drilled, ¼ bushel. Paddy (rice), 30 to 40 lb. Cow pea, 8 lb. Jerusalem artichoke, 3 to 4 cwt.

The weights per bushel of the principal farm seeds enumerated above are:—

Barley, 50 lb; beans, 60 lb.; buckwheat, 50 lb.; couch grass, 40 lb.; cocksfoot, 20 lb.; clover, 60 lb.; flax, 60 lb.; grasses (mixed), 20 lb.; oats, 40 lb.; imphee, 40 lb.; prairie grass, 20 lb.; perennial rye grass, 20 lb.; peas, 60 lb.; rye, 60 lb.; rib grass, 60 lb.; sorghum, 40 lb.; lucerne, 60 lb.; panicum, 60 lb.; maize, 56 lb.; wheat, 60 lb.

CO-OPERATION AND BULK-HANDLING OF GRAIN.

At the eighth Annual Conference of the Farmers and Settlers' Association of New South Wales, held on 5th July, two subjects were dealt with which co-incidentally were discussed at the Conference of Queensland farmers at Warwick in June last. From the *Sydney Mail* we take the following notes on co-operation and on the bulk-handling of grain which will prove of interest to those who read papers on the subjects at Warwick and to the farming community generally:—

"At the invitation of the directors of the Co-operative Wool and Produce Company the delegates proceeded at noon to the new stores of the company now nearing completion at Pyrmont. The visitors were received by Mr. F. Bacon, chairman of the board of directors, and were shown over the huge building.

"Mr. F. Bacon reviewed the progress of the Co-operative Wool and Produce Company, and stated that last year, with a capital of £15,000, the sum of £8,750 had been cleared. The actual cost of wool-selling was 1½ per cent. The company charged 3 per cent. for the sale, and no other charges were made. One and a-half per cent. was put to the reserve fund, which was now £5,700, and the balance went to the shareholders. Last year the shareholders got £600; to-day they got £1,280. The capital last year was £3,000 or £4,000; this year it was £15,000. (Hear, hear.) As to the Farmers and Settlers' Co-operative Association, he hoped to see it flourish and prosper. New South Wales was getting an exportable surplus of wheat, and he thought it a good thing that the Railway Commissioners intended introducing modern handling machinery. (Applause.)

"Mr. G. F. Plunkett (chairman of the conference) thanked the directors of the company for their kind hospitality and the valuable assistance rendered in connection with the establishment of the Farmers' Co-operative Company. That building was a revelation to the farmers, and on behalf of the association he wished the wool company every success. (Applause.)

"Mr. S. McCaughey, M.L.C., said he was glad to see in that store a body of men who in a few years would be enjoying all the advantages of a co-operative company of their own. (Applause.) That company had many obstacles to overcome at the outset, because they had much opposition to the movement. There was not a wool store in the southern hemisphere that would be able to handle wool better than that company when the store was finished, and then the farmers, he felt sure, would follow the good example and get their grain sold at a minimum. (Applause.)

"Mr. J. J. Miller, manager of the Farmers and Settlers' Association, said they had that day seen a splendid evidence of the laying of the foundation stone of co-operation in New South Wales. (Hear, hear.) The farmers were starting a co-operative movement with regard to the disposal of wheat and produce, and they would hold to the movement as the woolgrowers had held to theirs, until it had placed itself in the hands of all who wanted it. (Applause.) Then the money would not find its way into the pockets of those who never earned it. If they allowed wheat to follow its ordinary course through the dealers' hands there was a leakage of 6d. per bushel on the journey from the farm to the hands of the miller in England. Now the company was bringing it down from the farm and putting it in the mills for less than a farthing per bushel. (Applause.) That was the case also with regard to chaff. It cost from £9 to £11 to realise on £100 in the market of Sydney. It was possible for the co-operative auctioneer to earn £100 in a morning, and therefore farmers lost that sum every morning. A reaper and binder that cost the farmer in cash £55 could be bought at the manufacturer's warehouse for £18. The co-operative company had brought the price of machinery down by 50 per cent. The company had been in existence for six months, and had not only paid all expenses, but had £400 to its credit. (Hear, hear.) What then might it not do in six years? The Co-operative Wool and Produce Company and the Farmers and Settlers' Co-operative Company were destined to be the most gigantic business concerns in Australia. (Applause.)

HANDLING GRAIN IN BULK.

Mr. G. Pagan (Vict.) addressed himself to the question of grain handling in bulk, which he set out in his prefatory remarks as one of vital importance to the producer. Wheat could be grown to perfection in Victoria and New South Wales, but if we were behind in the method of handling and marketing we could never compete with other countries in the markets of the world. The bag question was a large one to wheatgrowers. They bought a bag for 6d. (in Victoria), and when wheat was selling at 2s. 6d. a bushel, only received in return for the bag 1½d. By adopting the bulk system the bag was altogether done away with, and thus there would be a direct gain of 1½d. per bushel. Then as to the matter of grading, that was a highly important phase of the question. If our wheat were sent home under the grading system instead of on the fair average sample principle, the grower or exporter would get a ticket or certificate from the Government expert, as was done now in Victoria in regard to butter. Thus it would be shown in connection with any crop how much was No. 1 grade, and that wheat would be good enough anywhere in the world, and the growers would find a benefit of about 1s. a quarter. The blocks that frequently occurred when wheat was being sent down to the port in large quantities would be done away with, and the ship's side would be relieved from congestion. Owing to that congestion, instructions had frequently to be sent to country buyers to cease operations, and consequently local prices fell from ½d. to 1d. per bushel. Therefore because the wheat could not be stored, the farmer was a loser by a mere side issue. Then a ship that would take a week to load in the ordinary way would be loaded in 12 hours under the bulk system. That was a very big item. He was pleased to hear that the New South Wales Government had placed £100,000 on the Estimates for irrigation and sheds, storehouses, and elevators for grain. He would advise that half of that amount be spent in building an elevator at the port of shipment. He mentioned that sum because the exportable surplus of grain was at present limited. The right place at which to put an elevator was, in his opinion, at the port of shipment, and from there to extend them backwards. He knew that there was a difference of opinion, and that some held the proper course was to begin up country and work towards the port. His view was that the outlet should first be arranged. He also held that the farmers should build their granaries on the railway platforms, and have the storehouses there. (Applause.) Then the farmer could drive his grain direct from the stripper or thresher, and the question of

bad roads would not have to be contended with as an impediment to shipment. If a start was made with an elevator costing £50,000, it would be quite sufficient. An elevator of that cost would hold 1,000,000 bushels. The cost would be at the rate of 1s. per bushel. Mr. Sinclair placed the estimate at 8d. to 9d. per bushel, and Dr. Cobb's estimate was about the same. He, however, calculated at the greater rate for safety. The surplus in Victoria last year was 14,000,000 bushels. That quantity could be put through in seven months with an elevator of the size mentioned. That would be large enough for Victoria, and he thought also for New South Wales. It could be easily added to in size as required. Now take that 14,000,000 bushels as an example of the position. For bags and selling on the grading principle at the very least 3d. per bushel would be saved, which would represent a sum of £175,000; deduct a charge of ¼d. per bushel for putting it through the elevator, taking it from the trucks, grading and shipping it to the market (£14,583), and interest on £50,000 at 4 per cent. (£2,000), which gave a total of £16,583; balance, representing direct gain to the farmers, £158,417. The saving that would therefore be effected on one season's crop would be enough to pay for three elevators. (Applause.) Objection was taken in many quarters that ships would have to be specially fitted, but on that point he had Mr. Sinclair's opinion that such a trouble would be easily overcome. The wheat could be put into the bottom of the ship and flour bags packed on top of it; the wheat could be shipped partly in bulk and partly in bags, or the ship could be divided into compartments with rough portable slabs. The latter would be a very inexpensive and simple plan, and one which it was thought shippers would adopt. Some farmers raised objections to the effect that the system would involve much inconvenience. The objection of the farmers was a factor of prime importance, because if all the farmers were unanimous in demanding the elevators they would get them. He thought that the objections raised would all be withdrawn when the farmers fully understood the position. They thought they would have to alter their wagons, and they did not care to move out of the old groove; but the system could be commenced partly on the bulk and partly on the bag system. Then the bag would be filled just as it was now, carted to the railway station, tipped into the truck, sent to the ship, and they could get the bags back again; or, if preferable, box wagons could be made.

Sheep-dog Trials.

Very great interest is always evinced by the public, as well as by those connected with sheep-droving, in the trials of sheep-dogs at the National Association's annual gathering. The great intelligence of the dogs, their readiness to understand their master's signals, their quickness in anticipating a break-away or a rush of the sheep, are deserving of the greatest admiration, and testify to the ability of their trainers. It cannot fail to interest many of our readers to learn what is done in the old country in the direction of testing the sagacity of sheep-dogs. We, therefore, cull from the *Farmer and Stockbreeder* a short article on the subject, as well as an excellent illustration of the trial course at Tring Park, in the south of England.

Mr. R. S. Piggin, the writer of the article, says:—

"The growing popularity of sheep-dog trials, and also trials of sporting dogs, is becoming every year more marked. They are not only interesting to witness, but are most useful in testing the sagacity and working capabilities of the animals employed, and induce owners to train to a higher state of excellence

the instinct of these creatures, so that they may more efficiently assist man in the work for which they are specially bred. The sagacity of the Scotch collie, or sheep-dog, is proverbial; yet twenty years ago there were few that could be trusted to gather sheep from the open moor or mountain.

"The Welsh shepherds used a heeler. This was a small cur, whose natural propensity was to cleverly nip the heels of cattle or ponies, and dodge the kick which always followed the bite. He was used chiefly to chase back to the hills cattle and sheep that strayed down to the low pasture-lands reserved for hay or winter eating. The heeler would never go to the herd or gather sheep, but delighted to heel and chase away. Now we have a sheep-dog that will go in any direction to command, and safely gather sheep miles away, bringing them carefully to us, or driving, to signal, any way we choose, and always under the most perfect control.

"THE ART OF TRAINING.

"The advancement in the art of training the sheep-dog to his present high state of perfection is due mainly to the competitive trials which have become annual institutions in most of the large sheep runs in Great Britain, and, indeed, many of our most substantial agricultural societies—the North-East Agricultural Society of Ireland, at Belfast, and Castle Douglas, in Scotland—are including sheep-dog trials in their programmes as one of the chief attractions to the show. It is some years since Lord Rothschild took the initiative in introducing these trials into the South of England, and they are now held annually, with great success, in conjunction with the Tring Agricultural Society's Show, in Tring Park, which, for a one-day's show, is one of the best and most enjoyable in the country.

"An ill-trained dog is an infliction on his owner and whoever he comes in contact with, but the aid that a well-trained sheep-dog can render to the flock-master is simply invaluable, and, if he is a dog-lover, will derive much pleasure in noting the neatness and despatch of his willing servant in executing his orders, compared to the tardy efforts of the hind.

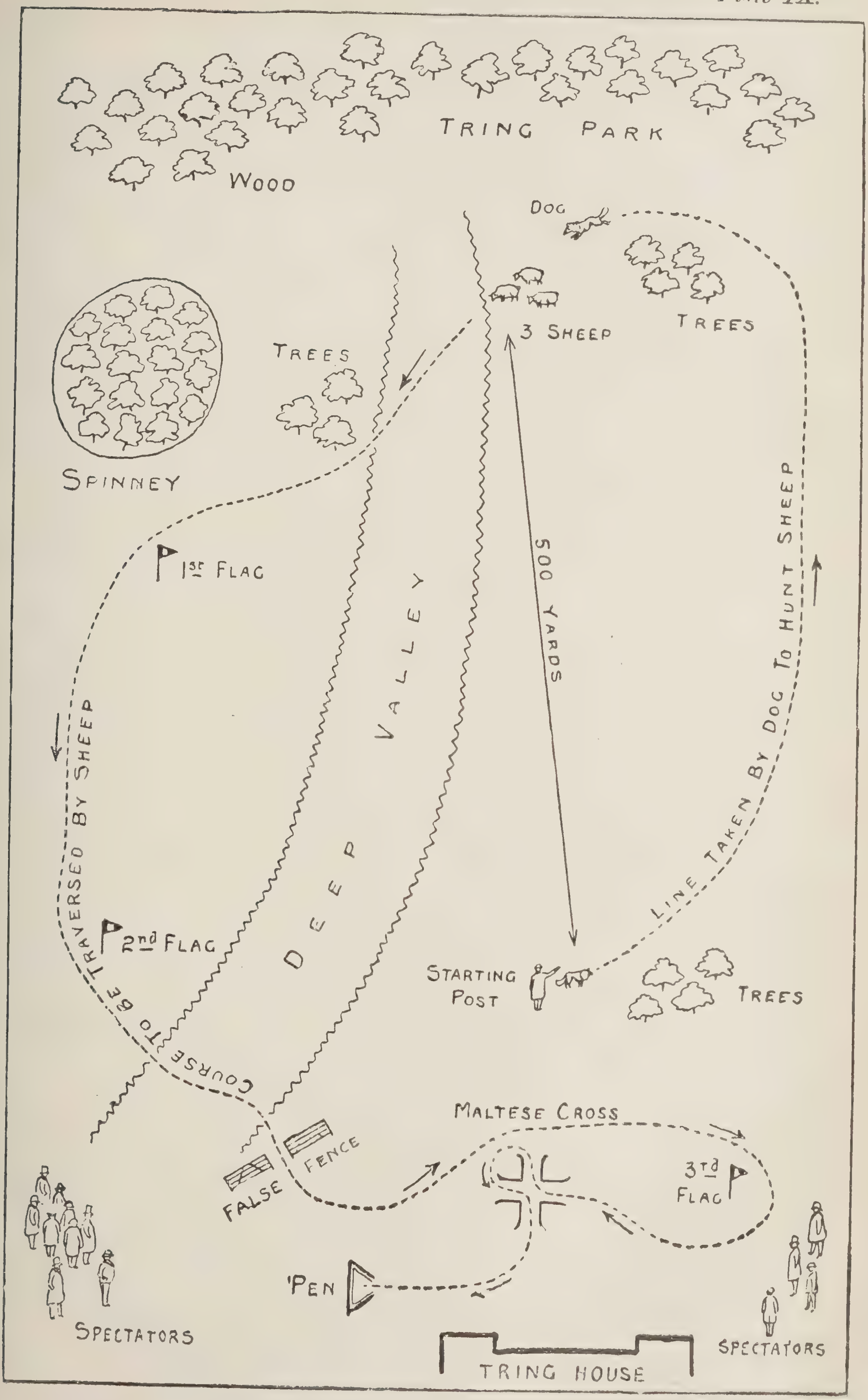
"Some might raise objections to sheep-dog trials on the ground of the possibility of shepherds disturbing the sheep too frequently in practising their young dog, to make them efficient. I think, however, it is only in very exceptional cases that they hunt the sheep to excess, and that their education is in favour of the farmer, and will greatly benefit him.

"The trial test varies very much, according to the disposition of the ground and obstacles, also the ideas of the various judges and managers. The accompanying sketch will give some idea of an ordinary trial course. The shepherd, being stationary, sends off his dog at a given signal, to gather three sheep, and drive them over a flagged course, and assist to pen, within a given time; the dog that shall show the best command and style in executing his task scoring higher than the one who bustles his sheep, or over-runs command.

"Prizes are frequently offered now for the best-looking sheep-dog competing in the trials, and I am glad to see a growing tendency to adopt the pure-bred show collie in place of the nondescript mongrel so common on the hills. The marvellous success of Champion Ormskirk Charlie by Champion Christopher, of Marcus Superbus by Champion Ormskirk Emerald, Country Girl by Edgbaston Excelsior, and Emerald Mystery by Champion Ormskirk Emerald, all belonging to same owner, prove their superiority, both commercially as workers and attractive as companions.

"The pure-bred old English bob-tail sheep-dog is also capable of being trained to a very high degree of perfection. This breed was my first love, and I can vouch for their pluck and sagacity as workers, and would recommend stock-breeders to try them. It has been taken up by Mr. Barcroft, one of our best trainers, with very great success, Old Trim, White Bob, and Sall placing many prizes to his credit."

Plate IX.



SHEEP-DOG TRIAL COURSE AT TRING.

Dairying.

A NEW CREAM SEPARATOR.

The value of the cream separator is no longer disputed, since all users admit that it is advantageous in increasing the quantity of butter, improving the quality, reducing labour, and giving the separated milk fresh and warm. Originally made in steam-power sizes only, the smaller machines have been brought out from time to time suitable for use in general farm dairies, worked by hand power; nevertheless, it has required a dairy of eight or ten cows to make it worth while incurring the expense of one of these machines, but a new size of "Alfa-Laval" separator has now been brought out which separates milk at the rate of 9 gallons per hour, and costs only £5 10s. It thus enables the owners of one or two cows to obtain all the advantages arising from the use of the separator, and will prove a great boon to those who have villa dairies or possess the proverbial "three acres and a cow." This machine, properly named the "Lilliput," might almost be called a pocket separator; the total height, including the feed tin, is under 18 inches. It is, in fact, a domestic machine almost to the same extent as the knife-cleaner and the mincing-machine; nevertheless, it is thoroughly well made, containing all the improvements of the renowned "Alfa-Laval" machine, including the new 1899 model, which was awarded a special silver medal and two first prizes at the Maidstone trials of the Royal Agricultural Society of England last June.—*Agricultural Gazette*, London.

[The hand separator is declared to be inimical to the interests of the butter industry of the colonies. The owner of three acres and *a* cow would, however, possibly find the cheap Lilliput separator of value for home use as a domestic machine.—Ed. *Q.A.J.*]

A CONFERENCE ON COWSHEDS.

In the West Riding of York (England), at Tadcaster, a meeting of sanitary inspectors has been held, says the *Mark Lane Express*, at which several matters appertaining to their professional several duties were discussed.

The representative of Tadcaster—who is not only the inspector, but also the surveyor to the local authority—read a paper on "Dairy Cowsheds and the Local Government Board Model Regulations." He complained of the visit of an inspector from Leeds to his district, and said that the information respecting the cowshed inspected could have been furnished by the local inspector if he had been communicated with. He then proceeded to say that milk was sent from his district to somewhere between half-a-dozen to half-a-score other towns in the immediate neighbourhood. This shows where the great evil arises under the new scheme of local government. Each of these towns, if they try to obtain the powers of extra mural inspection, will have the right to come and interfere in the regulations as to dairies and milkshops, and the result will be—as we pointed out in our last issue—that the unfortunate milk-producer will have to please the officials of as many authorities. Where this is to end no one knows, but it is just tantamount to making such a business impossible. . . .

The most interesting part of Mr. Denham's paper was that in which he explained his views as to the construction of cowsheds. As to ventilation, he was of opinion that there should be air grates on the floor level, and that no ventilators should be fixed in the walls, windows, or doors unless they were above the level of the cows' backs. All outlets for the impure air should be fixed at the highest point of the roof, a course which would avoid the possibility

of those dangerous down-draughts which frequently happen when the wind is in some particular quarter, which proves adverse to the drawing qualities of the ventilator. Another point, which is probably of very considerable moment if only properly understood, is the question of light. The reader of the paper remarked that there was a general notion among farmers that milch cows should be kept almost in darkness, under the belief that in such condition they would give more milk. It had been a mistaken idea, and already several cow-keepers who had made the experiment had had reason to alter their opinion, and had admitted that a well-lighted cowshed led to more cleanly and healthy conditions, and consequently to an increased production of milk. This only seems natural, for the cow is an animal which has been brought up in the light of day; and it seems absurd to think that it would be any the better by being immured in a dungeon. It is true, as some scientist once remarked, that the cow is rapidly being turned into a milk manufactory and ceasing to be an animal; but it has not yet reached that stage, and therefore it must be the best course to deal with the cow in the nearest way we can to that which Nature indicates.

Mr. Denham also is very emphatic as to the necessity of the very best drainage for all liquid manure, and he considers that the tank for the reception of such should be at least 60 feet from the cowshed. This also sounds reasonable. He further believes that at least 600 cubic feet of air space should be allowed for each animal; and this idea is perhaps a very reasonable one. Another important point which no one can deny, is that it is essential that the water supply shall be not only pure, but also plentiful. The one point with which we cannot agree is that the owner of the premises should make all the structural alterations which the inspectors consider necessary. Why should this be? If a man lets premises he lets them as they are; and if the tenant wants them for another purpose, he must in reason pay for the necessary alterations, or if he wants his landlord to bear such expense, then he must be prepared to pay an extra rent for the money which has been expended upon his holding. The conference gives much food for reflection.

FATAL EFFECTS OF GREEN SORGHUM.

In a recent article on the value of sorghum for forage in the warmer parts of the State, we (*Pacific Rural Press*) added a warning on the feeding of second growth. The matter has just been reported upon in a preliminary way by R. S. Hiltner, of the Nebraska Experiment Station, and we haste to give the conclusions. Stockmen frequently suffer losses of cattle from pasturing them on sorghum. In a few herds in the State the losses last year were heavy, but the total number of fatalities was not alarmingly large. An unusually large acreage of cane was pastured last season, so that the loss sustained was relatively small, judging from reports received.

Just what the cause of the trouble is has never been ascertained. The prevailing opinion is that a virulently poisonous substance is sometimes developed by the growing plant. Many symptoms shown by the afflicted cattle tend to sustain such an opinion. The animals bloat but little. They apparently suffer terribly and die very suddenly. *Post-mortem* examinations are reported to show lesions in the stomach, the membrane turning black.

A sample of cane that had produced fatal results was obtained and subjected to a careful chemical analysis. All efforts, however, to isolate and identify poisonous matter failed utterly. Although an effort was made to detect the presence of toxic substances in small quantities, it was assumed that refined delicate tests for traces of such poison were really unnecessary from the nature of the case. A poison that will kill a full-grown animal in ten or fifteen minutes must necessarily be present in relatively large proportions. The analysis showed only a trace of potassium nitrate. Cultures made to develop toxic bacteria

from the sample gave negative results. The leaves and stems of the material seemed to be free from parasitic growth. No poisonous matter, that might have been applied purposely to the leaves, was detected.

All the data collected indicates plainly that first-growth sorghum may prove at times to be just as fatal as second-growth. This controverts the prevailing popular impression, but facts at hand nevertheless corroborate such a view. It is in harmony with what is known of the chemistry of all plants. The chemical substances found in plant tissues are characteristic of the plant, and are found in it in its various stages of growth.

The results of the investigation indicate, then, first, that in sorghum there is no inherent chemical poison, and, second, that second-growth cane, of itself, is no more injurious than first-growth. The fact that so many fatalities occur proves that there is an element of danger in using sorghum for pasturage, and that considerable care should be taken in feeding it. Stockmen generally are agreed that hungry cattle should not be turned on to sorghum pasture, even for a short time.

In connection with the above, the following information, which is not generally known, may be of some interest: Mr. F. M. Bailey, Government Botanist, suggested that inquiry should be made into the physical properties of portions of the bamboo, which, he had reason to believe, were used in India for the purpose of causing death to human beings. We looked into the matter accordingly, and found that in the older bamboo plants a kind of fluid is secreted in the hollow joints. This fluid contains some solid matter which is gradually developed, and is considered to possess high medicinal properties amongst Eastern nations. The "Encyclopædia Britannica" mentions it, and says it goes by the name of *tabaxir* or *tobascheer*, but states that as a medicinal agent the bamboo is almost or entirely inert, and it has never been received into the European *materia medica*. However this may be, we know that vegetable irritant poisons are contained in the poppy, wolfibane, foxglove, deadly nightshade, elaterium, gamboge, aloes, colocynth, and croton oil is a good example of a vegetable irritant. When animal and vegetable food have decomposed, they may produce violent irritant symptoms. Nausea, vomiting, and thirst ensue, speedily followed by distension of the whole abdomen, followed generally by diarrhœa. Then inflammatory fever sets in, followed by collapse, and death may ensue in a few hours.

Now, may it not be possible that there is some irritant concrete substance contained in the fluids of the joints of sorghum, similar to that contained in the bamboo? The bamboo is merely a gigantic grass, so is sorghum. Is it not further possible that this particular irritant, not having been traced by analysis in any grass, except the bamboo, may only develop its poisonous qualities in the process of mastication by the cattle or horse, do its deadly work, and pass off during the subsequent profuse diarrhœa, and so escape detection?

AUSTRALASIAN BUTTER.

At the conclusion of the late Agricultural Conference at Warwick, Mr. Reid, of the firm of Denhan and Reid, of Yangan, spoke on the subject of the reduced price now obtained in the London market for Australian butter, and he attributed the cause to the inferiority of the butter owing to the use by the farmers of hand separators. In New South Wales, owing to advices having been received of the mediocre quality of butter imported into England from that colony, the Minister for Agriculture has arrived at the conclusion that something must be done in order to preserve a high standard for the New South Wales butter exports. Investigation into the cause of the mediocrity reveals the fact that it is owing to the farmers in some districts using hand separators. The Government dairy experts declares that this is so, and that farmers must either cease to practice or be content to accept a low price for their inferior product. That a

continuance of the practice of mixing all kinds of cream will result in the gravest injury to the butter trade seems pretty certain, as may be seen from a perusal of the following article in the *British Australasian*, and especially that portion of the extract which refers to quality :—

THE AUSTRALASIAN BUTTER SEASON.

With the close of the Australasian butter season here it becomes pertinent to review in such manner as is possible the course run by the trade since the earliest consignments arrived in September last. To the end that whatever of ciriticism or suggestion is made should be of assured foundation, we have taken pains to supplement the results of our own observation by personal inquiry among agents and dealers here whose business it is to detect the intrinsic qualities which go to make or unmake the position in the market of the wares they handle.

A view of the season, as a whole, then, must give prominence to two outstanding characteristics. The first and most obtrusive is the enormous leap forward in the quantity of butter arriving from Australasia; the second, the very large quantity of "fishy" butter sent into the London market by New South Wales and Victoria. Perhaps a third can be seen in the distinct improvement of the quantity, quality, and standing of New Zealand butter.

QUANTITY.

To take these characteristics in order: the total quantity received here up to the end of April amounted to 24,000 tons, in round numbers, an increase of 10,000 tons over the receipts in the preceding year, and an average monthly increase of 1,250 tons. Of this really phenomenal growth in quantity Victoria contributes 6,000 tons, New Zealand over 3,000 tons, and New South Wales rather less than 1,000 tons. Queensland and South Australia also show a slight increase, but it is to be observed that the returns really afford no accurate criterion of Queensland's actual import, owing to the fact that most of the butter from that colony is transhipped at Sydney, and so is credited in the Customs returns to New South Wales. That difficulty, however, could be easily overcome. It only requires that consignees here should make correct returns of the place of origin. But that is a digression. One particular fact strikingly emphasises the growth of this trade. It is that in one month—viz., January—the arrivals of butter from Australasia exceeded those from Denmark for the first time in history. Another feature of the season was the large arrival of stored butter in the first two months—September and October. This, it is to be inferred, will now be an annual occurrence, owing to the growing increase in dairy herds in Australasia, and the adoption of the practice of winter feeding. It is not, however, an unmixed blessing, for there can be no doubt that prices were somewhat affected by the large arrivals even last autumn, when the drought prevailing all over Europe during the summer months had caused such scarcity that prices reached a height they had not attained for many years. That being so, the result of large arrivals of accumulated stock in a season of ordinary plenty would certainly be on the frosty side of pleasant for the producer. The way of escape seems, therefore, to lie in extending the length of the season as the output increases, until it runs round the cycle of the year. That, again, involves milking all the year round, as is the custom in the mother country. Such another opportunity of disposing of large quantities of stored butter at high prices as was found at the beginning of this season is not likely to recur speedily, but its effects may be more than evanescent if regard for quality is preserved by the makers, seeing that the general scarcity compelled the introduction of Australasian butter in many quarters where it had not previously obtained an entrance. As to range of prices, the season for new butter opened early in October at 126s. for "choicest" factories, but by the end of the month 112s. was top value. All through November-December prices gradually declined until 100s. was reached in the middle of January. From thence to Easter values continued the downward course, when 90s. to 92s. was top value. After Easter there was a little spurt, and 94s. was attained for fancy brands.

QUALITY.

Complaints of the great quantity of "fishy" tasted butter arriving this season from Victoria and New South Wales formed the dominant note of the comment of every dealer consulted about the general quality of the season's butter. With one exception they agreed also that the quantity of this class of butter was not only actually but proportionately very much greater than in previous seasons, the dissident holding that the increase of the tainted article was due solely to the greater quality of the total receipts, and not to any swelling of the proportion affected. It was generally acknowledged, too, that the first arrivals were less affected than subsequent ones, and one firm handling a very large quantity was distinctly of opinion that the latest consignments were again freer from the taint than those arriving in February and March. A single agent was firmly convinced that much of the second-class Victorian butter contained a greater proportion of water than formerly, which not only depreciated its immediate price, but lowered its value as a storing butter. Others, without giving a decided adhesion to this view, were inclined to admit a certain degree of truth in it, while the gentleman mentioned as the exception in another matter was as strong in the conviction that the excess of water was only apparent, not real, and owing solely to globules of moisture forming round particles of salt mixed with the butter. However these things may be, it is certain that a large quantity of butter little calculated to sustain the reputation Australia has hitherto held has been shot over here this season. A few leading brands have maintained their high standard, but many of the second-class brands have sensibly deteriorated. In the words of one agent: "Factories that are usually 1s., 2s., or 3s. per cwt. below the best, sank to 4s., 5s., and 6s. below. Now," he went on, "we are doing a big business in this colonial butter, and hope to do a bigger. If the quality were preserved, and fair warning given us of the increase, we could easily do with double the quantity we received this year. There is a market for almost any quantity of good butter here during the winter, but people don't want a lot of inferior stuff. Whether it is due to want of care or inexperience in the makers I don't know, but we have received so much very second-rate stuff from Victoria and New South Wales that it has driven many of our customers right off Australian butter. Read that," he continued, handing me a letter which ran as follows, under date of 26th April:—"In reply to your favour, we have not been buying Australian butter for some time. As we found the quality had gone off, we decided not to touch it any more this season. We are, however, open to buy large quantities of fancy New Zealand butter, and, if you have any you can offer, we should be pleased to hear from you." "That," commented the agent, "is from a man who buys 400 to 500 boxes a week, and it is only a sample of numerous others we receive." As a concrete instance typical of many is worth columns of declamation, the letter is given here verbatim, for the benefit of those whom it may concern. The appreciation of New Zealand butter by every agent and dealer was as high as that of the writer of the letter. The occurrence of the "fishy" taste in it was stated to be rare, and slight where it was present at all. As a result, for the last two months, New Zealand butter has quite held its own with Australian butter, even in the highest classes, and running all grades together has exceeded the Australian average. The decided drop in the price of Australian butter, after the season had well opened, is almost unanimously ascribed to the prevalence of "fishy" butter, but it may have been accentuated by the great quantity arriving. The disparity between Australian and Danish butter in price was greater than in any previous year, but the Danish supply was short. Concerning Queensland butter, the criticism is made that it suffers from irregularity of quality. Some of it is equal to the best from the other colonies, but frequently boxes, even of the same brand, vary in price to the extent of 5s., 8s., or even 10s. a cwt. This is surmised to be due to there being too many days' make of butter in the same consignment—perhaps twenty or thirty in some cases, as compared with five or six in the other colonies. The comment on South Australian butter is generally that it was not quite up to the standard of former years.

CONDITION, Etc.

There is one phase of the trade concerning which unqualified satisfaction may be felt—*i.e.*, oversea carriage. In former seasons there has always been more or less complaint of the butter being damaged in carriage aboard ship. This year there is not a single case of the kind to record. A certain quantity of heated butter has arrived from Australia, but that was due in every instance to causes operating before shipment. There is ground also for viewing the periodicity of the arrivals complacently. There has been no huddled arrivals of several steamers, followed by great blanks. The weekly arrivals have been fairly evenly maintained from Australia, and the fortnightly arrivals from New Zealand, with the exception of last month, when one blank fortnight was created by the withdrawal from the service of the "Waiwera," chartered by the Government for the Cape.

THE DAIRY HERD.

QUEENSLAND AGRICULTURAL COLLEGE.

Returns from 1st to 30th June, 1900.

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.			
Blink* ...	Ayrshire... ...	21 Mar., 1900	879	3·6	35·43	
Bonnie ...	,, ...	17 April ,,	654	3·8	27·83	
Laverock* ...	,, ...	7 Dec. 1899	552	3·8	23·49	
Leesome ...	,, ...	12 Oct. ,,	28	4·3	1·34	Dry, 4-6-00
Linnet* ...	,, ...	15 May, 1900	562	3·6	22·65	
Lavina* ...	,, ...	6 April ,,	832	3·5	32·61	
Rosebud* ...	, ...	10 April ,,	845	3·6	34·07	
Annie Laurie*	... ...	30 May ,,	985	3·5	38·61	
Eileen ...	Jersey	13 Aug., 1899	65	5·8	4·22	Dry, 11-6-00
Effie* ...	,, ...	16 Dec. ,,	472	5·0	26·4	
Content* ...	,, ...	11 July ,,	18	6·0	1·2	Dry, 4-6-00
Ivy ...	,, ...	2 Oct. ,,	25	5·5	1·54	Dry, 4-6-00
Jersey Belle*	,, ...	21 May, 1900	554	4·5	27·92	
Opale* ...	,, ...	16 Dec., 1899	418	5·2	24·81	
Cherry ...	Shorthorn ...	19 Feb., 1900	510	3·9	22·27	
Florrie ...	,, ...	15 Sept., 1899	162	3·9	7·07	Dry, 23-6-00
Frizzy ...	,, ...	27 Sept. ,,	76	4·2	3·57	Dry, 11-6-00
Gladdy ...	,, ...	2 May, 1900	810	3·6	32·75	
Hilda ...	,, ...	25 Mar. ,,	640	3·6	25·80	
Kit ...	,, ...	16 Sept., 1899	452	3·8	19·23	
Louisa ...	,, ...	6 April, 1900	782	3·8	33·28	
May ...	,, ...	20 May ,,	788	3·6	31·77	
Nestor ...	,, ...	21 April ,,	695	3·7	28·8	
Folly ...	,, ...	15 Mar. ,,	515	3·5	20·18	
Alice ...	Grade Shorthorn	13 Nov., 1899	625	3·6	25·2	
Biddy ...	,, ,, ...	18 May ,,	330	3·9	14·41	Culled, 28-6-00
Duchess ...	,, ,, ...	27 Oct. ,,	151	3·9	6·59	Dry, 23-6-00
Daisy ...	,, ,, ...	21 Nov. ,,	150	4·1	6·88	Dry, 23-6-00
Eva ...	,, ,, ...	18 May, 1900	685	3·6	27·61	
Ginger ...	,, ,, ...	17 June, 1899	361	3·9	15·76	
Gertie ...	,, ,, ...	31 Mar., 1900	863	3·8	36·72	
Laurel ...	,, ,, ...	4 Oct., 1899	108	4·1	4·95	Dry, 21-6-00
Lady ...	,, ,, ...	31 Mar., 1900	287	3·5	11·25	Culled, 28-6-00
Nell ...	,, ,, ...	1 Dec., 1899	88	3·7	3·64	Culled, 11-6-00
Polly ...	,, ,, ...	29 Jan., 1900	533	3·6	21·49	
Podge ...	,, ,, ...	1 Nov., 1899	111	4·0	4·97	Dry, 23-6-00
Rosella ...	,, ,, ...	9 Oct. ,,	77	4·4	3·79	Dry, 11-6-00
Restless ...	,, ,, ...	4 Oct., 1900	115	3·6	4·63	Dry, 23-6-00
Rusty* ...	,, ,, ...	17 Jan. ,,	712	3·5	27·91	
Sally ...	,, ,, ...	23 Sept., 1899	363	3·5	14·22	
Trial ...	,, ,, ...	26 Oct. ,,	453	3·8	19·27	
Fancy* ...	South Coast ...	21 Mar., 1900	788	3·7	32·65	
Damsel* ...	Holstein ...	5 Dec., 1899	452	3·2	16·19	
Dairymaid*	,, ...	15 Mar., 1900	965	3·3	35·67	

The dairy herd were fed on green rye for first 12 days of month, and subsequently on green barley and green wheat and lucerne. All the pure breeds have been rugged since 1st of June, and those marked * have been housed at night since 16th of June, and have been fed on green barley and green wheat

A SEASON'S RECORD.

Herewith are supplied particulars of a season's record of the quantities of milk and butter produced by each of the eleven head of the College Dairy herd :—

STUMPY (Jersey).
Date of calving, 1st July, 1899.
Dry on 18th May, 1900.

Month.	Yield of Milk.	Average Test.	Commercial Butter.
	Lb.		Lb.
July	664	4·0	29·74
August	731	4·4	36·01
September	736	4·5	37·09
October	727	4·7	38·26
November	677	4·6	34·87
December	685	4·5	34·51
January, 1900	703	4·6	36·20
February	595	4·9	32·64
March	578	4·8	31·07
April	341	4·9	18·71
May	102	4·6	5·25
Total yields	6,539	...	334·35

EILEEN (Jersey).
Date of calving, 13th August, 1899.
Dry on 11th June, 1900.

Month.	Yield of Milk.	Average Test.	Commercial Butter.
	Lb.		Lb.
August	315	4·1	14·46
September	687	4·1	31·53
October	645	4·3	31·05
November	641	4·4	31·58
December	612	4·5	30·8
January, 1900	672	5·	37·6
February	486	5·1	27·75
March	512	5·3	30·39
April	384	5·5	23·65
May	288	5·2	16·77
June	65	5·8	4·22
Total yields	5,307	...	279·8

LEESOME (Ayrshire).
Date of calving, 12th October, 1899.
Dried off on 4th June, 1900.

Month.	Yield of Milk.	Average Test.	Commercial Butter.
	Lb.		Lb.
October	613	3·4	23·34
November	881	3·3	32·55
December	785	3·4	29·89
January, 1900	985	3·8	41·9
February...	784	3·8	33·36
March	673	3·9	29·38
April	488	3·9	21·31
May	278	4·0	12·45
June	28	4·3	1·34
Total yields	5,515	...	225·52

ANNIE LAURIE (Ayrshire).

Date of calving, 12th June, 1899.
Dried off on 28th January, 1900.

Month.	Yield of Milk.	Average Test.	Commercial Butter.
	Lb.		Lb.
June	433	3·5	16·96
July	850	3·6	34·27
August	763·5	3·7	31·6
September	789	3·8	33·57
October	786	3·0	26·4
November	664	3·2	23·79
December	633	3·5	24·8
January, 1900	382	4·2	18·8
Total yields	5,300·5	...	210·19

BLINK (Ayrshire).

Date of calving, 23rd April, 1899.
Dried off on 8th December, 1899.

Month.	Yield of Milk.	Average Test.	Commercial Butter.
	Lb.		Lb.
April	125	3·7	5·17
May	846	3·9	36·94
June	897	3·6	36·16
July	988	3·7	40·93
August	561	3·8	23·87
September	542	4·0	24·28
October	569	3·8	24·2
November	368	3·6	14·82
December	55	3·8	2·34
Total yields	4,951	...	208·71

LAUREL (Grade Shorthorn).

Date of calving, 4th October, 1899.
Dried off on 23rd June, 1900.

Month.	Yield of Milk.	Average Test.	Commercial Butter.
	Lb.		Lb.
October	796	3·3	29·41
November	812	3·6	32·73
December	792	3·8	33·7
January, 1900	853	3·7	35·34
February	778	3·6	31·3
March	671	3·9	29·3
April	583	3·7	24·15
May	491	3·9	21·45
June	108	4·1	4·95
Total yields	5,884	...	242·33

ROSELLA (Grade Shorthorn).

Date of calving, 9th October, 1899.
Dried off on 11th June, 1900.

Month.	Yield of Milk.	Average Test.	Commercial Butter.
	Lb.		Lb.
October	618	3 8	26·29
November	797	3·5	31.23
December	764	3·6	30·8
January, 1900	846	3·3	31 2
February	718	3·5	28·14
March	775	3·8	32 98
April	633	3·6	25·5
May	401	3 8	17 05
June	77	4·4	3·78
Total yields	5,629	...	226·97

EMPRESS (Grade Shorthorn).

Date of calving, 23rd August, 1899.
Dried off, 16th May, 1900.

Month.	Yield of Milk.	Average Test.	Commercial Butter.
	Lb.		Lb.
August	118	3·8	5·02
September	717	3·5	28·11
October	709	3·4	26·76
November	639	3·6	25·76
December	588	3·9	25·68
January, 1900	711	3·8	30·25
February	540	3·6	21·77
March	552	4·0	28·72
April	458	3·9	20·
May	151	4·4	7·94
Total yields	5,183	...	220·01

RESTLESS (Grade Shorthorn).

Date of calving, 4th October, 1899.
Dried off on 23rd June, 1900.

Month.	Yield of Milk.	Average Test.	Commercial Butter.
	Lb.		Lb.
October	785	2·9	25·49
November	732	3·3	27·0
December	743	3·3	27·45
January, 1900	814	3·5	31·89
February	647	3·4	24·61
March	668	3·8	28·43
April	610	3·9	26·64
May	548	3·7	22·7
June	115	3 6	4·63
Total yields	5,662	...	218·84

PAINTER (Shorthorn).
Date of calving, 4th September, 1899.
Dried off, 16th May, 1900.

Month.	Yield of Milk.	Average Test.	Commercial Butter.
	Lb.		Lb.
September	621	3·7	25·75
October	789	3·5	30·92
November	754	3·6	30·39
December	687	3·7	28·45
January, 1900	743	4·0	33·2
February	618	3·9	26·99
March	583	3·8	24·81
April	445	3·7	18·44
May	125	3·8	5·32
Total yields	5,365	...	224·27

BRUSH (Shorthorn).
Date of calving, 12th September, 1899.
Dried off on 14th May, 1900.

Month.	Yield of Milk.	Average Test.	Commercial Butter.
	Lb.		Lb.
September	386	3·9	16·85
October	814	3·8	34·64
November	712	3·9	29·5
December	592	3·8	25·18
January, 1900	786	3·8	33·4
February	585	3·9	25·54
March	579	3·7	23·99
April	394	3·9	17·2
May	121	4·1	5·51
Total yields	4,969	...	211·81

FEEDING PIGS.

In an address at the Farmers' Institute, Ontario, Professor Robertson dealt with the question of pig-feeding. He said: The food should be sufficiently nutritious to supply all the material that the growing pig needs. I have had the bones of pigs grown on a diet containing some skim-milk put in a testing machine, and then I have had the bones of pigs of the same litter fed on grain only tested, and it took 81 lb. greater pressure to break the bones of the pigs fed on skim-milk than that required to break the bones of the pigs fed on grain alone. The skim-milk furnished something that the grain did not, which the pig needed. It is hardly practicable to raise young pigs with profit unless there is a supply of skim-milk or butter-milk. Next to skim-milk in value is clover pasture for young pigs to furnish the flesh-forming materials. In some of the western countries the porkpackers say that clover is bad for pigs. By going to Western Ontario this autumn I found out how they fed their pigs. They raise their young pigs on (Indian) corn in pens after they are weaned, and then turn the grown shoats on a clover pasture to fatten before they are sold. That would not make a very excellent kind of bacon. But if the practice were reversed, and the pigs when growing bone and muscle and vital organs were put on clover until upwards of 100 lb. in weight, and then put on corn or a grain ration composed half of corn, you could get a very good quality of bacon with the least possible cost to the grower. The food given to pigs should never be in a decayed condition. It should be served regularly, and offered in such a way that the

pigs will eat it up clean three times a day. There is a lot of loss by feeding pigs more than they can digest. An over-fed pig lies down instead of taking exercise. It does not pay to feed a pig so much that there is something left over in his trough after he is fed. The flesh-forming parts in food should be in correct proportion to that part of the food that goes to produce heat and make fat—that is called the nutritive ratio. In the case of pigs, the nutritive ratio is found to be best at about 1 to 4½ or 1 to 5. Bran is 1 to 5; shorts, 1 to 5½; shorts and water make a very fair feed. Corn is 1 to 9—it has too much of the fat-producing, heat-producing qualities to the amount of flesh-forming qualities, and the lean parts of the pig will not be sufficiently nourished by it. Skim-milk has a nutritive ratio of 1 to 2, so that with Indian corn and skim-milk you have a very fair combination—similar to beef-steak and potatoes, bread and butter, &c. Reasonable combinations of food like that, with the narrow and wide rations put together in a meal, enable the farmer to use corn with safety and profit, but to feed it with whey is wasteful folly, because they are both wide in nutritive ratio. The whey contains chiefly sugar and fat, and both foods are largely wasted. Whey is the thing with peas, which are of too narrow a ratio. Foods having a wide nutritive ratio should be mixed with those having a narrow one. It pays to have the food for milking sows fed cooked and warm, but with other pigs it does not seem to make any difference. Pigs will grow faster on steamed food than on raw, but they consume about equal quantities per lb. of increase. As to the whole or ground food, pigs consume about 10 per cent. more of the whole grain, therefore it pays to have it ground. There is no difference in the cost, but there is a slight difference in favour of the ground grain in the general growth and healthiness of the pigs. As to feeding soaked or dry, I find that pigs give a little better gain from dry grain, but the quality is not quite so good, and there is a certain amount of risk as to health. On the whole, I am in favour of ground grain food soaked.

PROFITABLE PIG-KEEPING.

Some people say that there is no profit in pigs. Those who hold this opinion are quite right. There is no profit in pigs—housed and fed as they are on many farms. An evil-smelling, foul, sour, knee-deep-in-mud log sty, with a few palings and a bundle of rotten straw for a roof, affording no shelter from storm, wind, or sun, is not the sort of place out of which a profit is to be made by keeping pigs. Swine fever and many other diseases revel in such places, as does the plague on a filthy wharf. We have seen scores of styes as bad as this in various parts of the colony; styes which had never been cleaned out since they were built; styes in which every crevice and crack in the wretched so-called floor was filled with a vile-smelling accumulation of clotted, greasy, rotting slime, the remains of countless buckets of slop thrown into a reeking trough, which also had never known the benefit of hot water and a scrubbing brush. Then as to the food supplied at irregular intervals to the unhappy tenants of these abodes of horror, every species of garbage, cooked and uncooked, usually the latter, is thrown over the logs on to the mud, to be mixed with old damaged cabbages, potatoes, pumpkins, &c., all in their raw state, and to be trampled into the mire under the name of food. No, under this kind of treatment, pigs will certainly not pay. Our friend, "Carfax," of the *Agricultural Gazette*, London, whom we always have pleasure in quoting, has much the same to say on the subject of dirty piggeries. But first he gives this description of what a model piggery should be:—

On every well-equipped pig-farm the piggery should include (1) a shelter, (2) fattening pens and yard, (3) pens for sows with litters, (4) sow and boar pens, (5) a meal-shed and food-mixing place, and (6) a slaughter and cooling shed. If all but the latter of these can be arranged under one roof, a most compact yet roomy structure may be put up at very little outlay comparatively. A good plan for a set of pig erections should be made, and in that site and convenience for drainage will be considered. Site may be much a matter of

convenience, but low-lying damp ground, or ground sloping to north, and missing full sunshine, must be avoided. Whatever the site, a good plan of drainage must be secured. The rain water from the roof of the structure must be carried away. All liquid from the pens, and all water used for washing and flushing, should run into a tank to be used on the farm as liquid manure. The best floor for a set of piggeries is one of concrete. In planning the roofs have all rain water flowing to outside gutters.

THE SHAPE OF THE BUILDING.

An oblong or square building with a span roof over the whole will be the easiest to plan. There will then be a four square set of pens, &c., and an open court in the middle. The roof to cover this open court may be on pillars, and it may have an open space below its eaves between those and the roof of the pens for the purpose of securing full ventilation. If this roof is allowed to overlap, or project over the roofs of the pens, and the roofs of the pens are made to fall outwards, all rain water can be run into the one set of gutterings. The division into pens, sheds, &c., will depend on the purpose of the owner, and whether he intends keeping brood sows as his sole producers of fattening stock. A piggery for twelve sows will require about thirty pens. Such a set might be arranged thus: Along each side of the proposed court twelve, and across the further end six. The opening end of the court would then be left for sheds, root store, and food-mixing place. Roughly, a site of this size would cover an area of 100 feet by 66 feet. The twelve pens on each side of the court might then be of the uniform size of 8 feet square. The size would be large enough for a sow and her litter, or for five or six fattening pigs. Building on the course of two litters a year from each sow, and of fattening on half their offspring for the curer, and selling half at weaning time, would require twenty-four of the pens being kept for that use. The remaining six would serve for the boar, and for store, barren, or young sows.

MATERIALS FOR THE PIGGERY.

The outer walls of the entire structure would be best built of brick. If the matter of close economy is not being imperatively studied, and a substantial, good-looking erection is being aimed at, brickwork throughout will be preferable. The partitions and the inner walls may then be all of brickwork. In this case good bricks, well set in best mortar and front seams filled with cement, will pay to use. A roof throughout of slates, or of corrugated iron, will be more a matter of cost and taste than of utility. People who object to corrugated iron in hot weather, on account of the heat it gathers in the structure beneath it, will find the same occur under a roof of slates. Limewashing either corrugated or slate roofings above and below in hot weather helps greatly to counteract the heat they throw off. If the outer walls only are to be of brickwork, corrugated and flat sheet zinc may be used for division walls and for forming courts. Oak and deal battened doors or sliding doors may be decided upon, or the apertures may be closed by zinc or iron panels or gates. It will be as well when deciding on the latter arrangement to so plan the doors or gates to the outer courts that the little pigs can get in and out when they so wish. That plan saves a great deal of labour, and of opening and shutting of doors. A three-holed sliding shutter serves capitally for that purpose. A few oats and peas will entice the little pigs to come out, and when once they learn the way they will make a free use of the sheltered court, and get air and exercise at the minimum of trouble to the attendant. The exercise court should be divided into two or three spaces, so that sows, store, and litters may be kept apart when running out. Of course, the attendant will allow each pen or section its necessary share of the use of the courts as he sees fit.

THE MEAL AND ROOT STORE AND MIXING-SHED.

There will be space across the end of the oblong court to allow of two places or sheds each 12 feet long, and a gateway 12 feet wide to fill the end of the court. One of these sheds will serve for a store for roots and straw, and the other for a store for meal and grain. The gateway, 12 feet wide, should

be closed with twin doors at the outside, and twin gates to admit to the court. There will be space within this gateway for food-mixing and for storing tools, spare troughs, &c. The sheds on each side of the gateway will require outer doors as well as doors communicating with the gateway. By means of the folding doors, a cart can be drawn right into the covered court when dung is to be taken out; little pigs can be loaded for market under cover, and heavy troughs be got in and out with a saving of manual labour. Roots, such as kohl-rabi, and cabbage or green tares, can also be brought in by the same means of access. As sows, as well as little pigs, are best fed under cover in wet or stormy weather, a good use will be made of this convenience in carting food.

CLEANLINESS.

It is a string that is frequently harped upon is this one of cleanliness; but we cannot cut it on that account. On even such a set of structures as the above described, there is a possibility of having an outbreak of swine fever. I once went to see a pig farm not far from Bristol, where the structures were all that could be desired, and yet where the scourge of swine fever had cleared the place, and led to a proscribing of the district. The place was dirty, sour, and foul when I saw it. In the interstices of the stone flooring, behind troughs, and plastered on walls and doors everywhere, was a sour accumulation of a greasy and mealy nature that told of spilt food that was never cleared up. The place looked as though clean water had never been swilled and flushed over it since it was built. The tubs and tanks for keeping sloppy food in were as foul and sour. It occurred to me to suggest a thorough swilling and scrubbing of everything, and a good dusting over with freshly-slaked lime. But, no; the tenant was disheartened, and was going to quit. Here was a case of a well-equipped place ruined for want of cleanliness.

MILK TESTS AT MARYBOROUGH SHOW.

5th and 6th JULY, 1900.

5th JULY.

	Owner.	Name of Cow.	Lb. of Milk.	Per cent. Butter Fat.	Lb. Commercial Butter.
Morning.	Mr. Fowler	Victoria	$18\frac{3}{4}$	3·5	·734
	Ditto	Darkey	$14\frac{1}{4}$	3·6	·574
	Ditto	Lady	$16\frac{1}{4}$	3·7	·673
	Mr. Summers	Daisy	$14\frac{1}{4}$	4·0	·638
	Ditto	Primrose	$11\frac{1}{4}$	3·8	·478
Evening.	Mr. Fowler	Victoria	13	4·0	·582
	Ditto	Darkey	10	4·2	·470
	Ditto	Lady	$12\frac{3}{4}$	5·0	·713
	Mr. Summers	Daisy	14	6·2	·972
	Ditto	Primrose	10	6·0	·672
		6th JULY.			
Morning.	Mr. Fowler	Victoria	19	3·5	·744
	Ditto	Darkey	14	3·8	·595
	Ditto	Lady	$16\frac{1}{2}$	3·9	·720
	Mr. Summers	Daisy	$14\frac{3}{4}$	4·2	·693
	Ditto	Primrose	$11\frac{3}{4}$	4·0	·526
Evening.	Mr. Fowler	Victoria	13	4·0	·582
	Ditto	Darkey	$9\frac{1}{2}$	4·4	·468
	Ditto	Lady	12	5·0	·672
	Mr. Summers	Daisy	$12\frac{3}{4}$	5·4	·770
	Ditto	Primrose	10	5·4	·604

Total for Two Days.

	Victoria.	Darkey.	Lady.	Daisy.	Primrose.
First Day	1·316	1·044	1·386	1·610	1·150
Second Day	1·326	1·063	1·392	1·463	1·130
Total	2·642	2·107	2·778	3·073	2·280

MILK TESTS AT MACKAY SHOW,

28th and 29th JUNE, 1900.

FIRST DAY.

	Owner.	Name of Cow.	Lb. of Milk.	Per cent. Butter Fat.	Lb. Commercial Butter.
Morning.	Mr. Thorning	Lilly	14¼	3·4	·542
	Ditto	Betsy	13½	3·2	·483
	Ditto	Strawberry ...	12¾	3·0	·427
	Mr. Ball	Bally	9	3·0	·302
	Mr. Hunter	Roanie	9	2·8	·282
	Mr. McClenihan ...	Jessie	9¼	2·6	·268
	Mr. Harvison	Bounce	9½	5·2	·553
Evening.	Mr. Thorning	Lilly	9¼	4·4	·455
	Ditto	Betsy	10¼	4·6	·527
	Ditto	Strawberry ...	8¼	5·2	·480
	Mr. Ball	Bally	8⅓	5·8	·552
	Mr. Hunter ...	Roanie	7¾	5·8	·502
	Mr. McClenihan ...	Jessie	7½	2·8	·235
	Mr. Harvison	Bounce	5¾	5·6	·360
		SECOND DAY.			
Morning.	Mr. Thorning	Lilly	15	3·2	·537
	Ditto	Betsy	16	4·2	·752
	Ditto	Strawberry ...	13¼	3·8	·563
	Mr. Ball	Bally	12¾	4·0	·571
	Mr. Hunter	Roanie	9	2·8	·282
	Mr. McClenihan ...	Jessie	10	2·6	·291
	Mr. Harvison	Bounce	10	3·4	·380
Evening.	Mr. Thorning	Lilly	10	4·2	·470
	Ditto	Betsy	9½	6·0	·638
	Ditto	Strawberry ..	8½	5·0	·476
	Mr. Ball	Bally	7¼	4·8	·389
	Mr. Hunter	Roanie	8	4·9	·439
	Mr. McClenihan ...	Jessie	6½	2·6	·189
	Mr. Harvison	Bounce	6½	5·0	·364

Total Lb. of Commercial Butter for Two Days.

	Lilly.	Betsy.	Strawberry.	Bally.	Roanie.	Jessie.	Bounce.
First Day ...	·997	1·010	·907	·854	·784	·503	·913
Second Day ...	1·007	1·390	1·039	·960	·721	·480	·744
Total ...	2·004	2·400	1·946	1·814	1·505	·983	1·657

PROCESS BUTTER.

"It is not alone margarine, but also process butter, that our farmers will have to fight in the markets," remarked Professor Shaw at the Oregon Dairy Farmers' Association. "Vast quantities of process butter are now being manufactured. It is made of rancid butter bought from grocers. Those who make it buy the rancid butter from the grocers at soap grease prices. The first step with the rancid butter is to melt it. Steam is blown through it to remove the bad odours. Then the liquid butter is sprayed through ice water. The spraying suddenly cools the butter and returns it to the globular condition in which we find it in the churn. Then the stuff is rechurned in buttermilk to give it the flavour of butter. After this it is probably treated with saltpetre, which, however, is carefully washed out. Process butter is one of the most dangerous products with which the farmer has to compete. It is made very cheaply, is hard to distinguish from pure butter, and when put on the market in large quantities is sure to force prices down."

The Horse.

HORSE-BREEDING FOR MILITARY REMOUNTS.

The Indian Government has expended enormous sums on horse-breeding stations, with the result that these establishments have proved to be absolute failures. One of the difficulties to be faced by the Indian authorities has been the want of facilities for running foals in the open. Mr. Kersagee,* an Indian gentleman, who accompanied Veterinary Lieutenant-Colonel Anderson, who has been in Australia for the purpose of buying horses for the Indian Military Service, when interviewed by Veterinary Lieutenant-Colonel Irving on the subject of the Indian horse-breeding stations, admitted that they were a failure. He said :—"We cannot let our foals run out in the open on account of the tigers. These animals will approach a village and carry off a man, so there is very little chance of letting mares and foals run loose. The climate also is against the building up of stamina in our native-bred horses. Station after station has been given up, and we import our horses mostly from Australia."

Now, in the face of this testimony from an Indian officer, it must be concluded that horse-breeding in India is a failure, despite the importation of pedigree stallions. The reason is that horse-breeding in India has to be conducted much on the same lines as it is carried on in colder climates. The stock has to be housed, and many precautions have to be taken to ensure the health of both stallions and mares. It has now been fully determined that horse-breeding in India can never be successful. This being conceded, we propose to show how the remounts for the Indian Army can be regularly provided for.

Australia is eminently adapted for the industry of horse-breeding. There are localities such as the country about Nanango all over the colony, and some of those close to Brisbane, notably Ipswich and Mount Brisbane, the Laidley district, the Logan, and many others which are eminently adapted to the breeding of horses. If we were to enumerate all the districts in which horses can be bred to perfection, we should have to issue a separate index to the *Journal.* Suffice it now to say that Queensland can produce every class of horse required for military purposes, and that the requirements in the way of feed, run, and breed are all ready to hand in this colony.

We would, therefore, suggest that the British-Indian Government would be studying its own interests by establishing horse-breeding stations in Queensland. Of course all parts of the colony are not specially adapted for the horse-breeding industry ; but, as we have pointed out, there are many districts which are specially adapted by Nature for such purposes, particularly Nanango and the other districts above mentioned. There, excellent horses, both draught and saddle, have been produced in former times. Why have the breeders given up the industry ? Veterinary Lieutenant-Colonel Irving, who purchased the horses for all the Queensland contingents sent to South Africa, says that there is no breeding ground in the world to compare with certain portions of Queensland. In these districts mares and foals can run without fear of any attack by wild animals, and they are practically immune from any sickness.

Seeing that this colony of Queensland is so well adapted for the rearing of horse stock, why should not the Indian Government transfer its operations in the way of breeding establishments—such a failure in India—to Queensland ?

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* That is the way the name sounds when spoken, but I don't suppose for one moment that I have hit off the right way to spell it.—J.S.

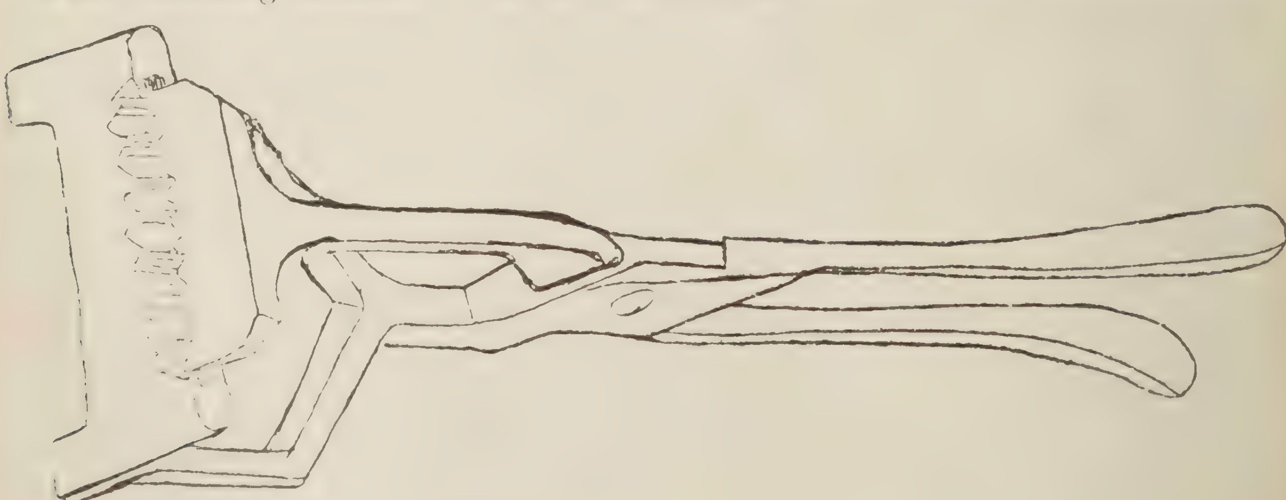
Many thousands of pounds have been expended by that Government on the purchase of blood stock—with what results? The answer is—failure. We would, therefore, suggest, and we feel assured that all horse-breeders will be with us in the suggestion that the Indian Government should establish breeding stations in various parts of the colony, which experienced men point out as being especially adapted for the purpose. These establishments might be carried on under Imperial officers, assisted by the local experts. If this were done, it is not too sanguine an expectation that within six or eight years, Indian remounts would be exclusively derived from this source. Horses could be eventually provided in regular shipments of animals of four years of age, and they could be selected, not in the haphazard style as is the case at present, but systematically by those in charge of the Imperial stock-breeding establishments.

A word about the horses selected for the four contingents sent from this colony to South Africa. These animals were specially selected by a board of officers, assisted by the professional knowledge of Veterinary Lieutenant-Colonel Irving, M.R.C.V.S., London. They were a particularly good stamp of animal, yet, on their arrival in Africa, they rapidly came to grief. Why? Anyone who knows anything about the transport by sea of horses, knows that on their being landed they require at least a couple of weeks to recover from the effects of standing for three or four weeks in their narrow stalls. Their legs swell, and they require a lengthened rest to enable them to do the heavy work and rapid travelling demanded of them. The horses of some of the Queensland contingents were landed at Capetown, and almost immediately were entrained for De Aar. Arrived there, they were called upon next day to perform almost forced marches; and can it be any wonder that they succumbed to the trial? Men can stand up against forced marches, but a freshly landed horse is not equal to the endurance of a man. Our contingents were supplied with one horse per man, and it would have been better if they could have been supplied with three horses per man to enable them to be continuously mounted.

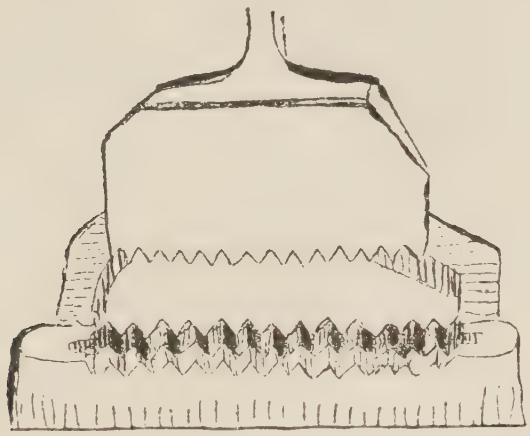
The moral of all this is: Let the squatters and farmers breed horses of the right stamp for mounted infantry operations; and let the Indian Government establish breeding stations in Queensland, which will yield far better results than the expensive and yet useless stations in India.

A USEFUL EMASCULATOR.

A most useful instrument (says the *Australasian*) for castrating horses has been invented by Professor Kendall, of the Melbourne Veterinary College. It does away with the old clamps and searing irons, is extremely easy of application, and is much more safe than any other instrument hitherto used for the purpose. The emasculator is made of steel, and nickel-plated. It is used in the following manner:—The scrotum having been opened, the testes are



both drawn out; the spermatic cord of each is severed by the instrument in quick succession, and the animal is released at once from his fastenings. The whole operation does not take more than a few seconds. Professor Kendall has used this instrument frequently during the last two years, and in every case with the greatest success. Horses in training have been taken to the Veterinary College, operated on, and have then walked several miles to their



stables without any ill effects. The operation of the emasculator is to grind the cord and bloodvessels through, instead of cutting them. The result is that there is no bleeding, and the parts heal up in a very short time, without any ulceration. The instrument may be used on bulls or rams as well as on horses. Fig. 1 shows the emasculator closed. Fig. 2 gives a front view of it partly open.

THE MOUNTED INFANTRY HORSE.

We have only lately, as it were, arrived at a clear idea of the kind of horse required for rapid movements by our mounted infantry. It is no longer *de rigueur* that officers should supply themselves with handsome, fine-bred, upstanding animals, or that the men should be mounted on tall horses. It has been amply proved that the smaller class of horses, such as were selected by the Government Veterinary Surgeon, Lieutenant-Colonel Irving, for the later contingents sent to South Africa—small, active, healthy weight-carriers—have far greater staying powers, are easier to mount in a hurry, require less food and even less care than the chargers of the past. The mounted infantry horse, in full marching order, has no little weight to carry, exclusive of the man, as the following will show:—

HORSE FURNITURE—

	lb.	oz.		lb.	oz.
Saddle	10	0	Braces	0	4
Rifle	9	15	Holdall	0	10
Bridle	2	0	Towel and Soap ...	0	9
Ammunition ...	4	0	Housewife ...	0	3
Forage	6	0			

SOLDIER'S KIT—

Boots	4	6	Hat	0	6
Frock	3	0			
Pantaloons ...	2	8	Total	49	2
Ankle-boots ...	1	14	Add the man's		
Haversack (filled)	1	8	weight, say ...	150	0
Shirt	1	0			
Jackspoon... ...	0	15		199	2

In many cases the horse carries a heavier man and additional accoutrements, which will bring the weight up to 250 lb.

HORSE-BREEDING.

By PROFESSOR J. HUGO REED, V.S., Guelph.

We give a few illustrations, showing some of the desirable and undesirable points of conformation of the horse. From these illustrations the breeder will be able to inform himself as to the various features and traits of disposition, also the correct and incorrect position of the limbs, feet, &c.

Fig. A.—Shows a very good head of a thoroughbred. The general expression and attitude denote intelligence, ambition, and docility. The crest is nicely arched, but not bulky; head gracefully attached and well carried: all muscles and the jugular gutter well marked.

Fig. B.—Shows a good head and neck of a trotting or road horse.

Fig. C.—Shows a good head, but the neck is very deficient, being too long and thin, and much too fine where attached to head. Necks of this description are usually accompanied by a small head, with little space between the angles of the lower jaw. Consequently, the space occupied by the larnyx (that cartilaginous box at the commencement of the windpipe) is limited, not allowing

sufficient room for expansion when large quantities of air are taken into the lungs during violent exercise, and as a consequence the animal is very liable to become a roarer.

Fig. D.—Represents an ill-formed head and neck. The neck is attached to the head in an ill manner. The mouth or nose is turned in too much towards the breast, which renders the animal practically uncontrollable unless a check-rein be used to keep his nose out. The eye, ear, and general expression

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denote stubbornness and ill-temper. For purposes of draught, the neck should be very much thicker and more heavily muscled than in light horses, but, nevertheless, the head should be properly attached.

Fig. E.—Shows a shapely, muscular neck for draught, rather thick at the attachment to the head, but at the same time well proportioned. The head is

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broad, strong, and rather large at the muzzle, not a serious fault even with driving horses, although a fine muzzle looks more attractive, and with large flexible nostrils this conformation may be very well marked.

Fig. F.—Shows a badly formed neck and shoulders, and ill-proportioned, badly formed head.

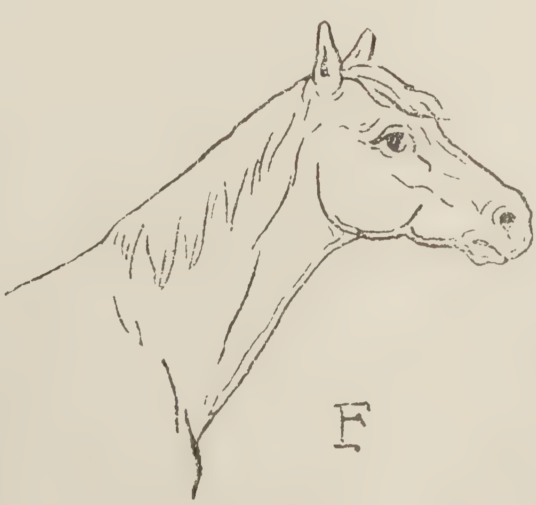

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Fig. G.—Shows an ewe-necked, vicious brute, the head set on too high, the dished face, shape and position of ears, wild expression of the eyes and

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position of lips denote a vicious disposition. The Roman nose also denotes stubbornness.

Fig. H.—Shows a strong, muscular neck and head; but at the same time the position of the ears, the eyes high in the head with a surly expression, the Roman nose, thick neck and jaw denote a treacherous and unsafe horse. Such

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a horse properly kept under control by a competent driver may be fairly well managed, but in careless or incompetent hands is liable to become vicious and intractable at any time.—*Australasian.*

THE DETERIORATION OF OUR HORSES.

By ERNEST A. SMITH.

It seems to be very generally admitted that of recent years the quality of our horses has deteriorated considerably. To a very great extent this is undoubtedly true, and can be accounted for by the general want of systematic breeding. Of course there are some notable exceptions, for fortunately there are a few stations where good thoroughbred stallions have been used for years and where a number of useful and saleable horses can consequently be found. But, speaking generally, horses have deteriorated greatly throughout the colony during the last twenty years, which may probably be attributed to several causes. First, the low price obtainable for saddle horses has discouraged breeders from going to any expense in getting really good stallions for their mares. Secondly, mares are never culled, anything being looked upon as good enough to get a foal out of; and, thirdly, the number of persons who breed horses nowadays has, owing to a much larger country population, greatly increased, and horsebreeding is no longer, as before, in the hands of wealthy squatters who were accustomed to use great discrimination in the choice both of stallions and mares. Those of us who can remember the horses we used to ride over twenty years ago can call to mind the size, substance, and quality of the horses on the best stations, and in those days animals of high stamp were worth money, for during that ante-railway epoch the necessity of horses that could travel fast and stay well was more apparent than it is ever likely to be again in Queensland. Even the town hacks of those days were remarkable for their qualities, for I can well remember riding a thoroughbred mare, about 15·2 in height, by Nemo

out of Gaslight, leaving Brisbane at 9 o'clock, reaching Ipswich comfortably at about noon, leaving Ipswich at 2·30 and reaching Fassifern Station soon after 5 p.m.. without the mare being in the slightest degree distressed, and going as freely at the finish as at the start. Horses that could travel 50, 60, or more miles a day were by no means uncommon; but, with the extension of our railway system, the need for such horses has been diminishing annually, and, there being no inducement to breed horses of the same class, the supply has diminished in the same ratio. The natural consequence has been that breeders have very generally been careless about the choice of a stallion for their mares, cheapness being now the great, and sometimes only, desideratum. Not only has this operated in weak, weedy, and unsound thoroughbred sires being used —being purchased for a song after having been raced to death—but also in colts by thoroughbreds out of common mares being kept entire and used to deteriorate the species. Then came the craze for hackney and trotting stallions, to put size and substance into all the weedy rubbish obtainable, and, in many instances, the use of half-bred Arabs or Persians, which also tended to increase the general deterioration. The result of all this is that now, when a fine market is open for the sale of horses to the Imperial remount authorities, a sufficient supply to establish the trade will not be obtainable without some trouble. And without drastic measures are soon taken to improve our horse stock by inducing our breeders to move in the right direction, it must be very doubtful if it would be possible to keep up a continuous supply. It is, therefore, to be noticed with some satisfaction that the National Association are offering substantial prizes for blood stallions at their approaching exhibition, the first prize being likely to be of the value of £50, with smaller sums for those obtaining second and third awards. If the principal studmasters of the colony avail themselves of the opportunity thus offered, the result should be decidedly advantageous, and I would suggest that next year a special effort should be made to encourage the showing of young thoroughbred stallions, before they have been spoilt by the rigid discipline of the training stable and the racecourse. The system of early two-year-old racing, now so universally in vogue, is largely accountable for the deterioration of our blood stock, and though, of course, no damage will result from using stallions that are constitutionally sound, it is always best for breeders to be on the safe side, and to see that stallions are thoroughly sound in wind and limb before using them in their stud. Purity of lineage is an essential qualification for a sire, and for general purposes there can be no doubt that stallions should be preferred in whose pedigrees the stout strains of Panic, Yattendon, Grandmaster, or Fisherman are to be found. Such stallions can be safely trusted to make the required improvement; and when another sire of equal qualifications is used on the daughters of the first, it stands to reason that each successive generation will show another step in the right direction. On the Downs, at any rate, and probably in many other parts of Queensland, it was the custom for farmers to send their common bred mares to a blood horse standing at five guineas or so; and if the progeny was a colt, to keep him entire and stand him in opposition to his sire at a very trifling fee, perhaps at not more than 10s. In this manner the half-bred sire, mated to mares of little or no breeding, did harm, instead of good, and the general deterioration that is now so noticeable was the result. Such is the condition of affairs that has to be combated at present, and with the increased demand for serviceable horseflesh there ought to be sufficient inducement to our principal breeders to bring about a better state of things. It is, however, the numerous body of squatters and farmers who breed horses, that require educating as to the way they should go, and therefore I suggested in last month's *Journal* that a system of subsidies, together with the examination and licensing of stallions, should be adopted, as is the case in England. The time has certainly come for some steps to be taken to prevent the increasing deterioration of our horses so as to enable Queensland to secure her fair share of a very profitable trade which only requires a little careful handling to form one of the chief and most payable industries of the colony. The necessity for Government inducements to the improvement of the breed of

horses is recognised pretty well all over the world. The Continental countries with their large standing armies have been forced to secure remounts for their cavalry through the agency of Government studs. France, for instance, has its "Haras Imperiales," established by Napoleon III., where stallions are kept for the use of the landowners and farmers, with the stipulation that their progeny is to be brought at four years old before a military board, who take all suitable animals at a certain fixed price. Germany, Austria, and Russia have for years past been large purchasers of the best English thoroughbred blood, and the buyers for these countries are seldom choked off by price when they wish to secure some first-class sire for their Government stud.

And now, one word with respect to Arabs, whose use some persons seem to think would be a panacea for all equine deficiencies. In the first place, a high-class Arab is seldom to be met, and the half-bred ones it would be most dangerous to breed from. No one has been a more firm believer in the Arabs than Mr. Blunt, of Crabbet Park, Sussex, England, who not only spent large sums of money on his fancy, but travelled personally to Arabia to procure the best specimens. Mr. Blunt has, for twenty years, bred from the purest Arab stock, and what has been the result? For the racecourse they are useless, being easily beaten by the most fourth-rate selling-platers, while for general purposes they are not much better. In a notice in the *Illustrated Sporting and Dramatic News* (England) of 9th June, Messrs. Tattersall state that among the fourteen horses and mares to be offered, on 7th July, from the Crabbet Park stud, will be found horses of the purest desert blood suitable for stud, polo, ladies' hacks, &c., &c. At the present time, we do not require to breed polo ponies or ladies' hacks in Queensland; and, therefore, we have only this one source to look to for improvement—namely, the English thoroughbred, who, by careful selection and breeding, has, in every way, vastly improved on his Eastern ancestry. As Adam Lindsay Gordon writes of them in his "Lay of the last Charger"—

We, too, sprung from mares of the prophets of Mecca,
And nursed through the pride that was born with the milk,
And filtered through "Crucifix," "Beeswing," "Rebecca,"
We love sheen of scarlet and shimmer of silk.
We, too, sprung from loins of the Ishmaelite stallions,
We glory in daring that dies or prevails;
From counter of squadrons and crash of battalions,
To rending of blackthorns and rattle of rails.

There can be no question that, by using carefully selected thoroughbred sires, and encouraging our breeders by means of subsidies, the present deterioration of our horses could be arrested, and an immeasurable improvement effected in the course of a very few years.

TRANSFUSION OF BLOOD.

Mr. Deans, who is already famous in Scotland for his special treatment of bog spavin and thoropin, now records the result of transfusion of blood as a tonic measure when all others have failed. The subject was a thoroughbred, and was anæmic after good feeding and other conditions, including vegetable and mineral tonics, big-bellied, and had a ravenous appetite, even eating peat moss litter, and so Mr. Deans decided to see what the introduction of healthy blood would do for him. About a gallon of blood from a healthy Shire was passed into the jugular vein of the patient. The improvement was great as well as rapid, and the animal was able to proceed to South Africa about six weeks later.

MEDIAN NEURECTOMY.

By Professor FRED. HOBDAY, R.V.C., Camden Town.

At a meeting of the North of England Veterinary Medical Association, Professor Hobday gave a practical demonstration of the above operation, and afterwards read the following paper:—

The operation of median neurectomy is one which has only been practised during recent years, and has not yet become generally known in England as an

operation of value. It was first performed by Peters, assistant in the Veterinary School of Berlin, about the year 1885, and in December of that year he read an article on the subject before the Berlin veterinary surgeons at one of their meetings. It was introduced into France in 1892 by M. Pellerin, who was at that time assistant at the Alfort School; this gentleman brought the subject to the notice of the Paris Central Medical Society in 1892, and again in 1894. It has also been practised in Italy and Belgium. For the above facts I am chiefly indebted to the little book written by M. Pellerin, and published last year.

The *operation* itself is not a difficult one, neither is it accompanied by any particular danger, if the anatomy of the part be first studied, and ordinary care taken; it consists simply in the excision of a portion of median nerve, high up on the inside of the elbow joint, just below the internal condyle of the humerus. In order to attain this end the animal should be cast on the side with the lame leg, and chloroformed; cocaine can be used, or the operation may be performed without any anæsthetic, but, as the nerve is a large one, it is, I think, best to use $CHCL_3$. There is also an additional advantage in the fact that the patient is still, and the leg can be stretched out to the fullest extent; besides which the operator can use his instruments with less likehood of accidentally injuring any of the surrounding structures. The usual antiseptic precautions as regards the skin are observed; a cross-hobble is then applied, and the leg, released from the other hobbles, is pulled downwards and forwards with a rope attached to the hoof, in order to expose the surface to be operated upon, and render it as tense as possible; at the same time it is of advantage to pull back the upper fore leg, and fasten it to one of the hind ones.

The operator, kneeling in front of the animal, close to the lower part of the chest and upper part of the fore limb, makes a bold incision about 2 inches long through the skin and aponeurotic portion of the pectoralis transversus muscle, about 1 to 3 inches (depending on the size of the horse) below the internal condyle of the humerus, and immediately behind the ridge formed by the radius. This latter, together with the radial artery and median nerve, which can be felt in their passage over the elbow-joint, form the chief landmarks. This situation is chosen for several reasons. If one gets higher there is more of the muscular tissue of the pectoralis transversus to be incised, and in attempting to operate near the elbow-joint there is the risk of injuring that or pricking the radial artery; besides, in this situation there is a branch given off to supply some of the muscles at the back of the radius which it is not wise to excise unless we have particular reason for so doing, on account of the liability to atrophy as a sequel. If one gets lower, the nerve is difficult to find, as it buries itself deeply behind the radius between the bone and the flexor metacarpi internus. The hæmorrhage which follows this incision is not usually of consequence, and can readily be checked by pressure or by artery forceps. The edges of the wound may now with advantage be held apart by two blunt hooks held by an assistant, or by means of two pieces of tape or silk passed through either side and tied underneath the limb.

We have now exposed to view the glistening white faschia covering the flexor metacarpi internus; this faschia, which is exceedingly tough, must be very cautiously incised, when the white median nerve will be exposed, showing up in striking contrast to the red fibres of the muscle itself. If not fortunate enough to have cut immediately over the nerve, this latter can be readily felt by passing one's finger under the faschia. The incision that we have just considered is the one about which most care must be exercised, as here we are in close proximity to the posterior radial artery and vein. These, however, can be distinguished from the nerve by the facts that the artery shows well-marked pulsations, and the vein is of a dark purple colour, and readily collapses on pressure. Any pressure on the nerve itself causes the animal to evince signs of pain unless deeply anæsthetised. The nerve lies a little in front of the vein, and the artery is here below each of them. This rule, however, is not constant, as in several cases we have found variations. If the incision be made with an ordinary sharp-pointed scalpel, it must be done cautiously by raising the faschia with forceps, and carefully guiding the blade with the cutting edge upwards; it

is much safer to lightly puncture the faschia, then introduce a director, and make the incision upwards with a probe-pointed bistoury. I have attempted tearing with the finger or a blunt tenaculum, but this is not a good plan nor easily done.

The next step is to raise the nerve and expose it to view; this is done by passing a blunt-pointed tenaculum underneath it, taking care to avoid injuring the artery or vein, and not to include either of these vessels; a portion of the nerve is raised from the surrounding structures and cut through with a blunt-pointed bistoury, or scissors, at its upper extremity, after which the lower part which falls back into the wound should be seized by forceps (artery forceps are most convenient) and pulled as far out of the wound as possible until about 2 inches can be removed.

The tenaculum which I have found most convenient for this is one which was designed by Mr. Simpson, of Maidenhead; its advantages are that its shape enables one to get much greater leverage, and the fact of its being made of metal all in one piece enables it to be more easily rendered aseptic. The shape of the handle, too, is of great advantage when withdrawing the nerve, as by forcing it underneath one does away with the necessity for using thread, and also effectually protects from accident the underlying structures.

The wound is well cleansed with antiseptics and sutured, the stitches being put close together (especially if one of the veins has been accidentally pricked). Aseptic catgut is decidedly the best material to use for this, and it must be left to the discretion of the operator as to whether it is best to suture both muscles and skin, or skin only. The plan I have adopted has been to suture both when the wound has been large, but only the skin when the wound is small.

After treatment consists in the application of plenty of cold water and antiseptics, releasing one or more sutures if necessary for drainage, and allowing a fair amount of exercise.

Immediately after the operation, as soon as the animal has been allowed to rise, in several cases I have observed a peculiar trembling of the limb which has been operated upon, but this has disappeared after a few moments' exercise. When trotted the horse may at once show improvement or may have lost all signs of lameness; the first few steps are sometimes taken in a peculiar manner as if the animal perceived some difference, but this quickly passes off, especially when the patient is put to a sharp trot for some little distance. It is worthy of note that in many cases in which improvement is only very slight, immediately after the operation, the lameness completely disappears as the wound heals; this fact, I see, has been observed by most of those who have practised median neurectomy. On the third or fourth day succeeding the operation the leg becomes swollen and the animal is very stiff and sore. This is reduced by the application of cold water and gentle exercise. In a week the leg will be about normal in size again, and the wound will be the chief object of attention. If all goes well, this heals in from ten days to three weeks, and the animal can be put to work ten days or so later. The work should at first be very light, and should be gradually increased until the horse is doing whatever may have been its customary amount.

Now we come to the consideration of the cases in which this operation is likely to prove of value, and to balance against that any bad sequelæ which are likely to ensue. The median nerve, as you will see in this dissected specimen which I have here, supplies with sensation almost the whole of the inside of the limb; it gives off small branches to the internal flexor of the metacarpus and a large branch to supply the other flexors of the limb. In the lower third of the radius it bifurcates into the external and internal plantars. As, however, the external plantar receives a branch from the ulnar nerve, section of the median does not totally deprive the outside of the foot of sensation. By sectioning the median nerve, then, below the branch which is given off to the flexor muscles, we do away with the fear of causing atrophy of these muscles, and deprive the greater part of the deeper structures on the inside of the limb (more particularly

below the knee) of sensation. That the skin on both inside and outside is still somewhat sensitive can be readily demonstrated by the aid of a pin; sensation in the former is due to the presence of an anti-brachial musculo-cutaneous branch given off above the seat of operation, and in the latter to the branch of the ulnar nerve which joins the external plantar. You will see, then, by a momentary study of the above, that the chief diseases likely to be benefited are those in connection with the inner aspect of the bones and tendons.

For diseases below the fetlock joint—such as navicular, ringbone, side-bones, &c.—there appears to me to be no advantage whatever over ordinary internal plantar neurectomy, and we have the disadvantage of having unnecessarily deprived a large part of the limb of its nerve supply. When testing its value for these diseases, if the outside of the foot was involved we usually found it necessary to cut the external plantar nerve afterwards, but for exostoses such as splints when placed well inside the leg and situated in such a way as to cause pain in a part supplied by the median nerve, or for chronically sprained condition of the flexor tendons, it certainly deserves a high place amongst the operations which we are called upon to perform.

Of course, like all neurectomies, it is not an operation which is to be indiscriminately advised. The chief sequelæ to be feared are those of softening and rupture of the flexor tendons and sloughing of the hoof; but, according to those who have largely practised median neurectomy the percentage is small. It is an operation that is to be especially advised in those cases of exostoses situated under the inside of the knee on the cannon bone, and chronic tendonitis, in which all other known methods of treatment have failed, and all of us in practice in large towns know how frequently these cases occur. In London, amongst the class of worn-out cab and cart horses such as one gets in the Free Clinique, I can testify most emphatically as to its value out of an experience of some thirty-eight cases, in which five were operated upon in both fore legs. Some of these cases have now been at work for more than twelve months since the operation; I traced most of them up a short time ago and could not detect any difference in their action, nor had the owners noticed any difference between the legs operated upon and the others.

Of these thirty-eight cases, and some of them were apparently quite incurable ones with other methods of treatment, we were able to send thirty-one back to work (the majority of these showing no lameness whatever), two are still under treatment, two were not at all improved, and I have been unable to trace the remaining three. At present there has been no rupture of tendons or sloughing of the hoof. That the latter may, however, occur I am able to assert from a communication recently made to a French journal, in which one case has occurred out of thirty-two operations—not a large percentage.

In cases of chronic tendonitis alone the prognosis may always be good; this is shown by the experience of foreign authors, and it is also our experience in our Free Clinique. If complicated by splints situated well on the inside, or if the lameness be due to splints alone (especially if in the abovementioned situation), the prognosis may also be good.

If the lameness be due or partially due to complications of exostoses on the lower part of the fetlock, ringbone, sidebone, or navicular disease, then it will frequently be found that the ordinary external plantar neurectomy will also have to be practised. In cases, however, of exostoses on upper part of fetlock, where the exostoses would remain in close proximity to the cut end of the internal plantar, be likely to cause irritation, one can with advantage perform median on the inside.

Before concluding, a few words are necessary about instruments. The only ones we used for the first few operations were a scalpel and forceps, blunt spreaders, tenaculum, scissors, and a curved needle; but one can with advantage add to those a director, blunt-pointed bistoury, two or three artery forceps, and another tenaculum. It is always wise, too, to have a tourniquet at hand.—*Veterinary Record.*

Poultry.

SELLING EGGS BY WEIGHT.

It has often been stated that eggs are eggs. No one will dispute the proposition, but there are pigeons' eggs and Brahma eggs, and a dozen of the former cannot be said to equal in food content a dozen of the latter. But not to put so fine a point on it, let us compare the eggs of Leghorn pullets with those of any breed which lays large eggs. If a dozen Leghorn pullets' eggs weigh $17\frac{1}{2}$ oz.; brown Leghorn hens, $21\frac{1}{2}$ oz.; Brahma pullets, $23\frac{1}{2}$ oz.; Langshan pullets, 24 oz.; Langshan hens, $26\frac{1}{2}$ oz; and Brahma hens, 28 oz., will people be willing to pay as much for the Leghorn pullet eggs as they would pay for those of the Brahma hen's, which weigh over double the former? It is not reasonable to suppose that they would. How, then, stands the case with the middleman—the storekeeper who buys his eggs from the farmer? Will he pay an equally high price for a mixed lot of pullets and hens' eggs as for an even lot of large hens' eggs? It may be taken for granted that the seller of the mixed lot will obtain less for his eggs than the seller of the large, even lot. How is the matter to be arranged? Obviously it cannot be settled by selling eggs by weight. Eggs are not like sugar, flour, corn, or salt. If a dozen eggs weigh some ounces over or some ounces under $1\frac{1}{2}$ lb., an egg or two may be removed or added to the scale, but the exact $1\frac{1}{2}$ lb. will rarely be managed. An egg cannot be cut in two to make up or reduce the weight, and the buyer may insist on exact weight. The only way out of the difficulty, and a very simple way it is, is to follow the advice given in an English paper, and that is, to grade the eggs. Let the batch for sale be large or small, but let them all be of uniform size. All Continental eggs are graded. The smaller eggs average sixteen for 1s., and the larger size twelve for 1s. With a rising or a falling market, the same proportion between number and price holds good. But the journal in question gives a plan by which the number of small eggs can be reduced to a minimum in the fowlhouse, taking as examples the Leghorns and the Wyandottes, two of the most useful and popular breeds, more celebrated for the quantity than for the size of their eggs:—"It may reasonably be argued that one can't have everything, but by setting only the largest eggs and weeding out the hens that lay the smallest—a big yearly average is not everything, remember—the average size can in time be improved. Varying strains of Wyandottes and Leghorns produce very different sized eggs. By striving continually to get a good average egg, much can be done to that end, and egg customers are satisfied—a very important point if we want to keep them.

HOW TO SET A HEN.

The form of sitting box which is commonly used for hens is very simple in construction, and can be easily and inexpensively made by anyone able to use a saw and hammer. The best size is 15 inches square, 18 inches high, but without any bottom. It should be solid on top and all round, but ventilation must be secured either by leaving a couple of inches open between the side boards all round and on top, or by boring a dozen holes in the sides and top, with half-a-dozen more on the line of the nest. In this way the hen will have plenty of air, and there will not be any danger of her becoming over-heated and sweating the eggs, which will also have the fresh air already mentioned. The front may be formed into a door, opening downwards, so as to give her a firm stand when leaving or returning to the nest. Or this door may be dispensed with if a piece

of sacking is hung down over the front. This form of box is suitable when the hen is to be allowed to come off herself, and is not to be lifted, for which reason it is better where a small number are kept in one place than if a large quantity are to be accommodated in one building. In the latter case it is better to make the front solid, and form the top into a lid, for then each hen will have to be lifted off every day for feeding. For some reasons it is better to so remove hens, as then the proper cooling of the eggs and feeding of the hen are insured, which is not always the case under the former system. Moreover, when she is off, the nest can be examined to see that no eggs have been broken, and they can be tested from time to time without disturbing her. But care must be taken in returning the hen, otherwise damage may result. Thus, the method here detailed is only suitable for quiet hens. Wild, nervous birds would not submit to be handled in this way. In France, hampers are frequently employed for sitting hens, and they are excellent for the purpose if provided with lids, as they ensure a proper circulation of air.

The floor where the boxes are to be placed should be prepared by laying thereon a thick bed—say 4 to 6 inches thick of moist earth, which must be broken up fine and levelled. The boxes are stood thereon, 6 inches from the wall, and at least 3 inches from each other, so as to permit of a proper circulation of air all round. Then, when the box is firmly in position, a big spadeful of earth is put inside, sufficient to fill up the corners, otherwise there is danger of the eggs when disturbed getting away from under the hen and becoming chilled. The earth is now hollowed into saucer shape, in order that the eggs may always roll back towards the centre. This is the form of nearly all nests, and we cannot do better than follow the natural teaching in this direction. Some poultry-keepers use grass sods for filling in the bottom of the nest. If properly cut to the exact size of the box, and beaten into the saucer shape, nothing can be better, but we fail to see any advantage over the loose earth, which entails less trouble and is, for the majority of people, more easily obtained. Upon the earth or sod should be placed a thin layer of straw, which is much better than hay. The latter is a retainer of heat, and for that reason is not so good as straw; it is more liable to bed hard, and also does not, by its structure, allow the circulation of air so desirable. Straw is thus to be preferred, but only as much should be used as will keep the eggs clear of the earth. It is an excellent plan to mix a little Izal or other good disinfecting powder with the earth, and to dust a little among the straw so as to keep down insects, but it must be merely a dusting.

Before any hen is put upon a nest of eggs, it is desirable to do all possible to cleanse her from parasites, if she should be troubled with these pests. To this end an examination should be made by turning up the feathers, and if there is the least sign of the black specks, she may be put into a box half full of fine, dry ashes, and allowed to dust herself there for an hour. Then, taking hold of her by the legs, she should be well dusted with Izal powder, and a little oil, or vaseline, or fat of any kind rubbed under the wings, between the thighs, and near the vent. Now she may be placed upon the nest, in which are a few dummy or infertile eggs, leaving her there until the next day, when, if she proves to be sitting closely, these eggs may be removed when she is fed, and those upon which she is to sit substituted. It would be unwise to oil her as recommended if she is to be put at once upon the batch of eggs she has to sit on, for she would coat these with it. In these cases we must be content with dusting her.

The chief difficulty in keeping a large number of hens together in one place arises from the feeding. It is not wise to allow several hens off together because there is always a risk of their fighting, and, moreover, we cannot ensure that they will each return to their own nest. Hence, we must feed them separately. If, say, fifty hens are sitting in a building, to let them each out separately, even for only fifteen minutes, would take close attention for more than twelve hours every day. This can be minimised by dividing the room by wire netting, so that, say, four or five birds can be out together. But the better plan is to have feeding cages under an open cover outside. These cages are made

20 inches to 24 inches square, with laths or rods in front, so that the hens can get their heads through for feeding. The floor must be thickly covered with fine dry ashes, in which some disinfecting powder has been mixed, to form a dust bath. Troughs for food and water are placed in front; and if, say, six of these cages are provided, each hen may be given half-an-hour for feeding and dusting; and yet fifty birds can be attended to in about four hours, allowing time for other work meanwhile. Further, if the hens are taken out and returned to their nests in rotation, there is no danger of their being put on the wrong nests—a more important matter than at first sight may appear. The food should consist of hard corn, and for this purpose wheat, barley, and oats are all excellent, but in cold weather a little maize may be added, as the large amount of carbo-hydrates therein will help to maintain the body heat. But the proportion should not be more than one part of maize to five or six of the other grains, for the hens, having no exercise, must not be fat.

When possible, three or more hens should always be set at the same time, for then, if the percentage of fertile eggs is found to be small when tested, as they should be on the sixth or seventh day, all the good eggs can be put under one or two hens, and those thus liberated can have a fresh supply. Early in the season this may mean a great saving, for then eggs are frequently less fertile than later on, and broody hens scarcer. To allow a hen to sit on infertile eggs is both wasting her time and the eggs, and if only half-a-dozen in each hatch can possibly produce chickens, when a hen can comfortably cover more than twice that number, is a loss of power which may mean a great deal. At the sixth or seventh day, by using a candle or lamp with a good reflector in a dark-walled room, the germ can easily be distinguished if the egg is held by the fingers so as to only permit the passage of light to the eye through the egg. But by means of an excellent testing lamp, recently introduced by Messrs. Dawson and Co., of Sparkhill, Birmingham, the germ can be distinguished much earlier, at, say, twenty-four or thirty-six hours. It is fitted with a good reflector and powerful condenser, so that the interior condition of the egg is more readily distinguished. The small cost is soon met by saving the infertile eggs at an early age.

Should an egg be broken by accident, all those remaining must be washed in water heated to 100 degrees Fahr., and the under parts of the hen herself treated in the same way.—*Agricultural Gazette*, London.

BREEDING GEESE FOR PROFIT.

By J.W.M.

As the goose is the earliest occupant of the poultry-yard to start breeding, it may be useful to the readers of this column to investigate the various breeds, and study their identification and general characteristics, for in geese, the same as ducks and fowls, there are varieties which are more adapted for laying purposes than others; while, on the other hand, there are those that are better fitted for table use than otherwise. As an early layer, its requirements must be looked to in good time. In fact, they have already mated, and in some instances started laying; nevertheless, there is plenty of time. Those thinking of breeding should select their stock. Geese should pay the farmer for keeping, as it is he that has the wide and open fields wherein they love to wander, and in which situation they thrive best, providing that there is a sufficient amount of green grass for them to nibble at. The spring season is in every way fitted for their propagation on an economical scale. Grass forms quite half the diet of the goose and her goslings, for when the young are only a day out of their shells, or even younger, they will be seen picking at the little blades of green grass if placed in the sunshine where they can be quiet. It must not be inferred that there will be no trouble or feeding needed. It is good that some trouble should be needed even in the producing

of geese. Consider the price of geese as shown by the markets throughout the year, and look at the quantities sent into the city markets during the Christmas season, and the comparatively small amount realised at this festive season, which is really the harvest of the year as far as geese are concerned, for they are not so much sought after at other periods. The birds at these sales for the most part are of no strain at all, and it would puzzle the renowned "Philadelphia lawyer" to tell the crosses they constitute, for the pure strain, if any ever existed, has run out ages ago, and the progeny now submitted have become ill-shaped and ill-flavoured altogether. This, coupled with bad management in fattening, culminates in extremely low prices, not only for these poor birds, but also makes a standard by which the better ones are judged. There needs to be an all-round improvement in the stock birds, and undoubtedly better results will be the consequence. Start by securing a pure-bred gander and a couple of geese, if funds will not permit more, and start systematically to breed from these, bearing in mind that inbreeding must be avoided, or else the same results will soon follow. If the progeny is kept next season, new strains must be mated to these to keep the blood in good order, and the frame and constitution robust.

In choosing the stock birds, care must be taken that they are perfectly healthy, and are free from inbred blood, for a bad start is ruinous. Select good large birds. It is not necessary for them to be excessively fat, for over-fatness is rather an impediment to prolific breeding. Nevertheless, the frame must be there, with a good display of meat in the right quarters, with the breast full and broad. When the stock birds have been secured, they will need to have a little alteration in pairing; for should more than one gander be kept in a confined place, there will sure to be war sooner or later until they are properly mated, for ganders are noted for quarrelsome propensities. Then see that the nests are supplied with plenty of clean fresh straw. I say "plenty," for there is nothing in the poultry-yard that can beat the goose or swan in packing up its nest. Care must be taken to place the nests apart as much as possible, as, if put side by side, with no protection, a fight often takes place, in which it may be that a nest of eggs that have been sat upon for some time becomes destroyed, and much time is lost. When the young come out they should be placed near green grass, and given soft food, such as a little bran and pollard mixed up, so that the small flakes will crumble up about the size of a split pea; but little water is needed, and this can be supplied in a sardine tin that has been well rinsed out with hot water. In a week or two the goslings will be well out of the way, and start looking out for themselves, their parents taking them away for the best part of the day, and returning at night to seek shelter in the yard, or near a haystack. It must be borne in mind that a month before sending into market, or before selling for table purposes, the young geese should have plenty of food of a fattening character. Bran and pollard in the morning are good, with wheat at night, and the midday meal of grain is also advisable. Give as much as the birds can eat. Although the market price for geese at Christmas time ranged about 2s. 6d. to 3s. 6d. each, yet prime geese, reared much on the same principles as I have advocated, have brought 6s. to 7s. 6d. each There are plenty of customers who are ready and willing to give top prices for the prime article, and even the ordinary dealer and poor consumer will be willing to give more for birds with meat on them than for the small scrubby frames generally offered them.—*Adelaide Observer*.

SOME POULTRY COMPUTATIONS.

O. W. Mapes, in the *Poultry Monthly*, gives an account of his five years' work with 1,000 hens per annum, and contrasts the results of keeping cows and keeping hens. He estimates that 2,000 good, but not fancy bred hens would cost at first outlay about the same money as twenty cows. A cow barn for twenty cows would cost in Orange county, New York, from 1,500 to 2,000

dollars. The same money would erect buildings of equally good material, style, and finish for 2,000 hens. He followed the separate colony plan, and kept forty hens in each house of 10 by 10 feet, and has kept fifty to sixty in a house, and could not see but that they did as well as when only twenty were kept together. But at forty hens to a house, he would need fifty houses for 2,000 hens, and the price of the cow barn would allow 30 to 40 dollars for each house.

He allows for feeding the cow 1½ tons of hay, 18 dollars; pasturing five months, 7·50 dollars; and 1 ton of grain, 18 dollars; a total of 43·50 dollars per cow, and 875 dollars for twenty cows. He finds by actual experience that it costs about 65 cents a year to feed a hen, or 1,300 dollars for 2,000, 425 dollars more than for the cows,

But what are the cash returns? He has had one hen lay 230 eggs in a year, but he puts such a hen in the class with cows that produce 5,000 to 6,000 lb. of milk a year, as not easy to be found or to be bought at low prices. He thinks not every farmer could pick up a herd of twenty cows that would yield a product worth 60 dollars a year, or 1,200 dollars for the twenty cows. He then places the probable yield at 8 to 10 dozen eggs in a year. For five years his egg product from 1,000 hens has never been less than 1·50 dollars per hen in a year, selling at 18 to 20 cents a dozen in Orange county, although many of his hens are kept until five or six years old. This, then, would be an income from eggs alone of 3,000 dollars from 2,000 hens, or 1,800 dollars more than from the twenty cows, and, after taking out the 425 dollars extra feed, a profit of 1,375 dollars more than that made on the cows.

MAKING CAPONS.

We have on previous occasions given instructions how to perform the operation of caponising cockerels. Mr. H. Leeney, M.R.C.V.S., writes to the *Farmer* :—

I am sorry to read in your poultry columns a description of caponing so utterly out of date, cruel, wasteful, and unsuccessful as that described by W. N. B.

As I have pupils from Cumberland to Devon willing to testify to having learned efficiently in one lesson occupying an hour, I may, without boasting, claim an intimate knowledge of the subject. It was from the American farmer (Miles) we learned in England how to do this operation properly, and, with your permission, I will briefly describe the process.

The birds are fasted for twenty to thirty hours in order to collapse the bowels. They are then placed on their side upon a convenient table, and held by an assistant with one wing back. The operator plucks off the soft feathers from the region of the last two ribs and the hollow of the flank in order to see as well as feel the ribs. An incision is then made between the two last ribs, about 1 inch long, and by one bold stroke. A spreading instrument is then introduced which keeps the ribs apart, enabling the caponer to see the testicle reposing against the great vein (*posterior vena cava*). Downward and forward is the direction to look for the organ, and if the bird has been properly prepared for fasting, and the testicle is not discoloured, as it sometimes is in the black breeds by pigmentation, it will be seen as a white bean-shaped body resembling a white runner bean both in size and superficial venation, if the cockerel is about three or four months old, as he should be, to make caponing profitable. A pair of spoon-like instruments are introduced into the abdomen in order to seize the testicle and withdraw it, twisting the hand at the same time in order to strangulate the blood-vessels. Some caponers divide the septum, or thin membrane dividing the abdomen, and remove both testicles from one side, but it is really much quicker to turn the bird and operate from both.

No needles and no sutures are required, as the ribs form a natural splint, bringing the edges of the wound in apposition immediately the bird is released. So far from requiring any artificial union, the only subsequent attention a capon needs is to see that he is not blown up with wind next day and in need of reopening with a penknife to allow the gases to escape. The only pain apparently suffered by this operation appears to be felt during the division of the skin, and many of my pupils have remarked on the birds picking up their own testicles and beginning to feed as soon as released from the operation table.

No subsequent precautions are necessary; the bird can at once rejoin the flock, and in all probability no sign of trouble will be apparent the next day.

The time to make capons is not in the spring, when any bit of a chick will sell well, but in autumn, when leggy cockerels are either fighting among themselves or chasing the hens about, neither fattening themselves nor letting others do so. Capons will make from 7 lb. to 10 lb. weight running about, without being put up to fat on stages, and the reason that caponing is not more popular in England is to be found in the old-fashioned methods advocated by your correspondent by which many deaths are incurred, and lingering ones, too, from peritonitis caused by the mauling and stitching afterwards.

By Miles' method, above described, the deaths are few, and when they occur it is from rupture of the great vein referred to above. As an expert can do about 40 birds per hour, they do not die upon the table, but immediately upon being released, tumbling over backwards, the victims of syncope from hemorrhage. Birds meeting their death in this way are just as fit for the table as though stuck in the jugular or killed by neck-breaking or chopping; the only thing necessary to do is to remove the clot from the abdomen and wash out with vinegar.

INDIAN RUNNER DUCKS.

We have received from Mr. L. E. Overstead, of Warwick, particulars of his Indian Runner Ducks. His "flock" were derived from the purebred stock of Mr. H. Cadell last August. The duck began laying shortly after a pair was purchased. After laying eighteen eggs, she met with an accident, and was nearly killed. Mr. Overstead set the eggs, and twelve ducklings were hatched, out of which eight were successfully reared. Meanwhile, the duck recovered, and began laying again, continuing to do so all last summer up to moulting time. The young ducks were sold; only a few laying birds and a drake being retained. Anyone desirous of obtaining eggs of this valuable variety should communicate with Mr. Overstead, who is prepared to sell settings guaranteed fertile at a reasonable price.

On the subject of these ducks he now writes:—I believe my ducks, being from Mr. Harold Cadell's stock, are typical specimens of the Indian Runner breed. The drake has a green head, white neck, the body is fawn and white, with a black patch on top of the tail where the curled feathers are. The bill is yellow. The duck is of a fawn ground colour with darker lacings, giving her a brown appearance; brown head, white neck, and a green bill. The legs are orange-coloured in both sexes. Tight plumage, long slim necks, and an erect carriage. The Runners are rather timid birds, and seem to have a wild strain in them, more so than any other breed of ducks I have kept. I therefore let them have their liberty as much as possible, and do not house them at all. All I do is to shut them up in a yard at night, so as to prevent them from "stealing" their nests, which they are apt to do when left roaming about at night. They do not, however, drop their eggs anywhere they happen to be, as is the habit of some ducks. The first two or three eggs, when they start laying, are almost invariably dropped on the ground, but, after that, they take better care and deposit them in a nest. When the duck is about to commence laying, the drake gets very busy running about looking for a suitable place, and even goes into the boxes quacking and nodding his head, as if to invite the duck

to try if that place will do. For nests I use boxes about 18 inches square, with the lid on, or, preferably, I turn the box upside down so that the nest is on the ground. I cut a hole in the side of the box big enough for the duck to get in and out comfortably, and then tack a piece of sacking over the opening so as to hang down and cover it all but a couple of inches. Some straw and a nest-egg complete the outfit. The ducks cover up their eggs after laying; in fact, the eggs are nearly always underneath the straw, right on the floor of the box. As the Runners are small, active birds, and always foraging about, they don't require much food. I feed mine twice a day, early in the morning and late at night. They don't trouble me all day, but turn up regularly for their meals. Boiled wheat, mixed with bran, pollard, and boiled potatoes or pumpkins made into a dough, is the food I give them, with some meat boiled and minced up now and again. Clean drinking water they get several times a day, and, as they have no water to swim in, I give them a tub to splash in sometimes. They do not seem to be any the worse for not having access to water, and my young ducks never had a swim from the time they were hatched until I disposed of them, they being then six months old and just commencing to lay. When I got my first Runners, I was living in the bush, and they had the use of a waterhole and also a bigger run than now, when they have only about an acre. I am sorry I cannot give any statistics of their laying powers, never having kept a written record. But I consider them far ahead of any breed of ducks or fowls whatever in that respect. One of my ducks became broody last January after laying continually for a long time. She lined her nest with down, and when she came off she covered up her china nest-egg very carefully. She would run about as if she were engaged in business of great importance, bolting her food and at once going back to the nest. If any fowls came in her way she stretched out her neck and went for them like a battering-ram, knocking them clean off their legs. Once, when she was off, I put some pieces of bark into the nest-box, covering up the nest. She seemed to be at a loss what to do when she found her nest gone. She ran in and out a few times, tried to shift the bark, but at last gave it up for a bad job and came away disgusted. About a week afterwards I missed her in the mornings, and one morning I detected her coming home at a great pace. I could see her tracks plainly on the dewy grass and followed them up. They led to a few tussocks of wiry grass about five or six chains away. Here I found a nest with three eggs in and a few straws and sticks across them. I also once found a nest fully a quarter of a mile from home. After that I always shut them up at night. Their eggs are not quite as large as ordinary ducks' eggs. From seven to eight go to the pound. On no account should the first eggs a young duck lays be set. I set seven of the first eggs last season and, although they all proved fertile, I only reared one duck. Four hatched all right—the other three I helped out. They were alive, but that was all. One had only an upper bill, the lower one was missing. The two others had malformed heads. They just gaped a few times and all was over. Out of the four, the three dropped away, one after the other. I feed the young ducklings on milk and oatmeal, or milk and bread, for the first week, and after that on boiled wheat, potatoes, and meat. I change the drinking water frequently, and put some clean, coarse sand in the bottom of the tin. I never give young ducks bran or pollard, as they are apt to get the stuff stuck all over their heads and bodies. Boiled wheat never has any bad effect on young ducks, but laying ducks will get weak in the legs from too much wheat. When the ducklings are a couple of weeks old I take the hen away and, if the weather is nice and warm, even before. A little box is put into the pen for them to sleep in. The pens are in dry, sunny places, and some bushes or sacking afford shade for the ducklings. As they grow, the pens are made larger, and if the ground gets sour and dirty, they are shifted on to fresh ground. When they are fledging, I let them out and only keep them in the pen at night. When given ordinary care, the ducks are easy to rear and very hardy, and if they get a shallow tin of water to splash in, they keep themselves beautifully clean.

POULTRY NOTES.

Sittings of Eggs.—An immense yearly increasing trade is done every spring and right into June in sittings of eggs for hatching. This method of changing stock or introducing fresh blood into the poultry-yard is, on the whole, a good one. To the seller it is seldom other than profitable; to the buyer it represents the risk of a few shillings at most, which a fine clutch of chickens, successfully reared, converts into a highly profitable speculation in a small way. But the novice, however good his stock, should not embark into it carelessly, or he may land into difficulties. He should, in the first place, not advertise eggs unless he is morally certain he can supply them. There are few things in poultry-keeping more irritating than to send a postal order for a sitting of eggs, and then have to wait an indefinite period before the order is fulfilled. Conversely it is irritating for the advertiser when the hens decline to lay quickly enough for him to despatch his order promptly; but these things will occur. Hens are not machines, and due allowance for some taking a rest should be made. The seller, if he wishes to build up a business in egg-selling for sittings (and the profits compare pleasantly with that made for table eggs only), must give his customers satisfaction, so that they will buy next year or repeat the order later in the season; the majority, at least, for nothing under twelve chickens from twelve eggs, and the chicks all reared successfully, will satisfy some people. Sending stale eggs should be carefully avoided, for these will not hatch, and only give the seller's stock a reputation for being sickly. Every care should be taken of the breeding pens; that the male birds are running with the right number of hens to ensure fertility in the eggs, and themselves healthy and vigorous. They must, therefore, have enough to eat supplied them, and apart from the hens, if they are prone to starve themselves when feeding in company. The hens should have a good supply of crushed oyster shell or mortar to help the shell formation. The shells should be smooth, and the eggs of good size and clear. When taken from the nest each should be distinctly marked; unless this is done, it is very easy for eggs from different pens to get mixed up before being sent away, and a few black Minorca hatch among White Leghorns to the more than annoyance of the purchaser. Very large eggs should be rejected, as they are possibly double-yolked, and two perfect and separate chickens have yet to be hatched from one shell.

The Packing.—Having got the eggs (eggs we are confident that, granted a fair chance, will give satisfaction), there comes the question of packing. Well, there are plenty of patent egg-boxes advertised, and much ingenuity has been exercised in this direction, and every dairy show sees new inventions exhibited. If the poultry-keeper sells many sittings it will be well to get in a lot, as these eggs are packed with the minimum of trouble and the best chances of reaching their destination undamaged. But if there are no patent egg-boxes available, and the poultry-keeper has to fall back on small wooden boxes from the grocer, these will serve if the eggs are properly packed, but it is all-important. There are many ways of packing successfully, and it seems as though the material used is of less importance than the skill or knack of the packer. For instance, I have received eggs packed in bran alone, unwrapped in paper, which have hatched very satisfactorily, but I confess I should not care to send out a sitting similarly packed. Whatever material used, it is well to wrap each egg first in a piece of soft brown paper, the softer the better. There is nothing to beat hay to pack eggs in, hay without hard stalks and soft to the touch. The box should be lined with it, and a whisp wrapped round each egg. They should be packed fairly close together, and hay crammed into all corners and crevices. If a second row of eggs has to be placed over the first, a layer of hay must lie between. On no account should the eggs touch; this is fatal. The address label should be nailed on the lid before it is placed on the box, and the lid should be fixed down with screws, not nails, for the hammering might jar the eggs. But with all the care the conscientious sender can take, the package is more or less at the railway porter's mercy. To give this functionary the minimum of

excuse for rough handling. a large printed notice—"Eggs"—should cover one side of the box. Failing hay, moss is excellent if it is to be had, while eggs wrapped in soft brown paper and packed in sweet bran or sawdust, if the box is carefully filled so that the eggs cannot move once till the lid is on, will, in most cases, travel successfully. After the eggs have been unpacked, and have had a rest of four-and-twenty hours, the sooner they go under a hen or in an incubator the better. An egg with a suspicion of a crack upon it should always go in an incubator—it will never survive a hen's foot; and if no incubator is available it had better be sacrificed, for it will only break some time during the period of incubation, and cause a mess; with the result—the rest of the eggs have to be washed and the hen given a fresh nest.—*Farmer and Stockbreeder.*

HOVEN.

WHERE TO PUNCTURE THE RUMEN.

At this time of the year, when green feed is plentiful, it is a common thing for cattle to become "hoven" or "blown," and if remedial measures are not adopted they often die. As a last resource, tapping is had recourse to. The instrument generally recommended for the purpose is the trocar and canula, which is about 8 inches in length by nearly ½-inch in diameter. The puncture

should be made on the left side at a point equally distant from the point of the hip, the last rib, and the transverse processes as shown in our illustration. The tube is opened by the removal of the trocar, the canula being left in as long as required, and retained by a string. Sometimes the rush of gas suddenly ceases before a sufficient quantity has escaped; this is due to solid matter having accumulated round the end of the canula. This, however, is easily overcome by a movement of the canula or the insertion of a probe. The chief precaution to observe is to make the opening in the beast at the proper place. If a trocar and canula is not available, the operation can be performed by the aid of a pocket-knife having a long blade.—*Australasian.*

The Orchard.

POTASSIUM CYANIDE.

The value of cyanide of potassium for the purpose of fumigating fruit trees has now been so conclusively demonstrated in other countries and in this colony by Mr. A. H. Benson, Fruit Expert to the Department of Agriculture, that this chemical is in great demand by fruitgrowers. There is no question as to its efficacy; but even in this matter, the evil of adulteration is becoming seriously apparent. The cyanide in use by this Department is guaranteed of 98 per cent. purity. Lately, a fruitgrower obtained some of this, and pronounced it "really good." He, however, obtained some from another source, and, after using it, he came to the conclusion that it was of very inferior quality, and consequently submitted it to a chemist for analysis. In his report, the chemist stated that the sample of cyanide, as was suspected by the purchaser, was of very inferior quality. It contained of potassium cyanide 27·50 per cent. The sample was a quite exceptionally poor one, the product being made up with potassium carbonate, potassium hydrate, and potassic cyanate, which are all quite valueless for fumigation. Such adulteration can only be considered as criminal. When a fruitgrower, pinning his faith to the cyanide process of fumigation, because he has seen it always successful when applied by the officers of the Agricultural Department, wishes to clear his trees of insect pests, and finds that the chemical he buys from some sources are so valueless that he might as well have fumigated his trees with Chinese joss sticks, he loses faith in the process, but takes no trouble to find out the reason of his failure. In this instance, however, the purchaser has taken the sensible course of submitting the cyanide to a chemist with the result that it has been proved to be anything but what it purported to be. We write this as a warning to fruitgrowers who are liable to be imposed upon by unscrupulous vendors of agricultural chemicals. The Department is always anxious to advise not only fruitgrowers, but all classes of agriculturists, and, if they so please, they can submit such cases as the above, and they will receive such advice as will enable them to avoid losses. The cost of an analysis of this nature is trivial compared with the losses which might occur for want of such analysis, and we would advise all who use artificial fertilisers or fumigating chemicals to see that they have a guaranteed analysis of the article they buy.

GRAFTING THE MANGO TREE.

Part II.

By HORACE KNIGHT.

TO REMOVE A SECTION OF BARK FOR GRAFTING.

First make a cut through the bark with a small saw at the two ends; then take a broad chisel, the bevel side being set towards the piece to come out, and give it a smart blow. Now turn the chisel over to the opposite side, repeat the blow, and the piece will fly out if the sap is at all active. Should the piece fail to come off, put the chisel into the sawcuts and prize gently. If it still sticks, put the sawcuts into the wood till they are down to the side. Cut and then split out the wood with the bark. The wood must now be

whittled out with a fine, sharp chisel without injuring the bark. It does not matter about the graft being dry so long as the stock is in prime condition. But if stock and graft are dry when the work is done, it may not prove successful. Do not be afraid of injuring your good trees by removing pieces of bark for grafting purposes, as the wounds will all heal up in twelve months, and, instead of hurting the tree, the process may make it more fruitful. A statement like this may want some verifying to be anything like satisfactory to some people's way of thinking, and one or two observations on this point may not do any harm just here. A mango tree some ten or twelve years old, and bearing only about a dozen fruits each year, was completely ringbarked on all its smaller limbs by opossums. The following season the tree had to be propped up to save it from breaking with its load of fruit. The next winter the opossums repeated the performance, and the tree again responded with a heavier load of fruit. But such heavy bearing would probably have been the death of the tree had it not been severely cut back as soon as the fruit matured. After the first ringbarking by the opossums, a valuable lesson was learned by watching the tree recovering itself. It was only reasonable to suppose the sap would run up the bleached tissures and unite with the bark on the higher side of the wounds. But, no—all the limbs below the wounds seemed to say to the umbrageous top, "Save yourselves if you can, you will get no help from us below, as we have decided to develop our latent forces by building up a new top entirely," and they started in a thorough practical manner to do it. The first young shoots made their appearance on the rings just below the wounded parts. A little later another set came out lower down and so on, when the old trunk contributed its share of vegetation. While all this young growth was going merrily on in the shade, the top to all appearances had not suffered. Why? Although deprived of most of its sustenance through natural channels, it still had all the outside living forces to co-operate with it, and by their aid it made a supreme effort to establish natural communications with the roots.

Could those wounded parts have reached the soil, they would have formed roots on their own account. They formed a callosity all round the wounds on the higher side. Some of the limbs had the bark off for a distance of 5 inches in length, with isolated patches of bark here and there. Now, this shiny brown callosity proceeded to grow, covering up all the bare wood as it crept along on its downward course, and the isolated patches of bark became callous all round, and did their share in the great work of filling up the open breaches. As soon as this was accomplished and ordinary communications established between roots and leaves, something now happened which completed the first lesson.

The young growth, which up to this time had the full force of a powerful root elaboration, received a sudden check. The beautiful green top now seemed to call out, "Below there! We were and are yet the sole controllers of this tree, and in future intend carrying on the business as heretofore." The young root seemed to know it, for it soon sickened, and was removed by the knife. Another case in point was a row of fine healthy trees which had been well looked after for nine years and had not fruited (they were seedlings from excellent sorts), and as the foliage was distinct on each tree, something good was expected of them. They were, therefore, granted another year to show fruit or be removed for shade trees. In the meantime all the available limbs of these trees were layered. The very same season these limbs which were layered all flowered, and most of them fruited, whereas the parents remained fruitless, and were removed the following season for shade purposes. The same results have followed where the limbs have been broken down by horses or by storms, or by bringing the limbs down below the horizontal line. Some Chinamen mutilate their trees to a surprising extent to make them more fruitful, and they certainly succeed for a time. The principle of mutilating mango trees for the express purpose of making them yield more fruit is wrong, unscientific, and ends by exhausting the trees and spoiling the beauty of their foliage, save when the root conditions are sufficiently favourable to repair the damages annually. Take

the case of the trees that were used for shade purposes. They were taken up with a solid cube of earth measuring 30 inches square by 20 inches deep, with all roots cut clean through to the cube measurement. They averaged 13 feet high, and the leading roots were followed out to 20 feet from the trunk, and, although cut back to within 15 inches of the trunk, most of the trees retained their beauty and fruited the following season after removal.

It must therefore be evident that root pruning is the better method to make mango trees fruitful. The object is attained by checking the flow of sap underground, instead of mutilating the trunk and limbs. Of course, root pruning would not apply to trees which have become barren through neglected cultivation, impoverished soil, or through any foreign agencies affecting the tree above ground. According to the above statements, we seem to have brought about a desirable condition in the barren tree without knowing or having clearly defined, how these conditions are brought about. It is certain we do not resort to such methods to make our domestic animals productive, although we practise largely the reverse-art successfully, and know clearly how it is effected.

These observations are somewhat irrelevant to the subject, but they have been factors in leading up to the present method of bark-grafting the mango. The case of ringbarking showed that a tree may be in excellent condition for grafting, and yet the bark would not slip. That is the case when a flow of sap is suddenly interrupted between the trunk and leaves, and cannot perform its ordinary functions. It is then used by the trunk and limbs (below the interruption) for building up sapwood, pruning the bark, and making general preparations for turning dormant buds into new growth. While this condition obtains, success is certain, and yet the bark may have to be scraped out for the reception of the graft. Of course this condition is best brought about in hot and good growing weather.

The object in grafting a large number of good varieties is to get a blend by cross-fertilisation, as, the flower spikes being in close proximity to each other, the chances of getting a new fruit are much more favourable than if the individual trees were wide apart. This would be proved when the seedling fruited. When that object is attained, the new fruit tree is then available for grafting and budding therefrom to any extent, as budding the mango, instead of grafting, will no doubt become the universal method of perpetuating the best varieties, as three or four generations from one bud can easily be obtained during one summer.

Among the excellent varieties of fibreless fruit, we now possess some that are extremely handsome, yet almost tasteless, while others are full flavoured, but ugly to look on. This is where skill and judgment are required to unite all the desirable constituents in one act.

MUMMY PEAS.

Most people have heard of "Mummy Wheat," said to be the result of sowing grains of wheat found in the hands of Egyptian mummies some 3,000 years old. Experiments point, however, to the improbability of wheat retaining its germinative power for such a long period. We now learn that a saddler of Kowes, in the Isle of Bute, Mr. R. A. Stewart, has succeeded in growing a fine crop of peas from seed found in the tomb of an ancient Egyptian king. Mr. Stewart got the peas from a Glasgow friend of his who has sons in Egypt, by whom they were forwarded to Glasgow, and the seed is estimated to have been 2,000 or 3,000 years old. The peas were sown in open ground, and the plants have grown up strong and vigorous to a height of about 6 feet. They possess certain characteristics. The flower of the modern garden pea, for instance, is always small and white, but the ancient Egyptian variety has a beautiful red centre, surrounded by a white corona, and looks very chaste and handsome. The pods average from 2 inches to 3 inches in length by half-an-inch in breadth, and the peas are said to be of excellent flavour.

Viticulture.

WINTER DRESSING FOR VINES.

By E. H. RAINFORD,
Viticultural Expert.

"God helps those who help themselves" is an old saying applicable to all matters agricultural, and especially viticultural; so if from remissness in using winter dressing, next season's crop is partly destroyed by blackspot or oidium, it will be unreasonable for the vigneron to fall out with Providence about it; he will have only himself to thank for it.

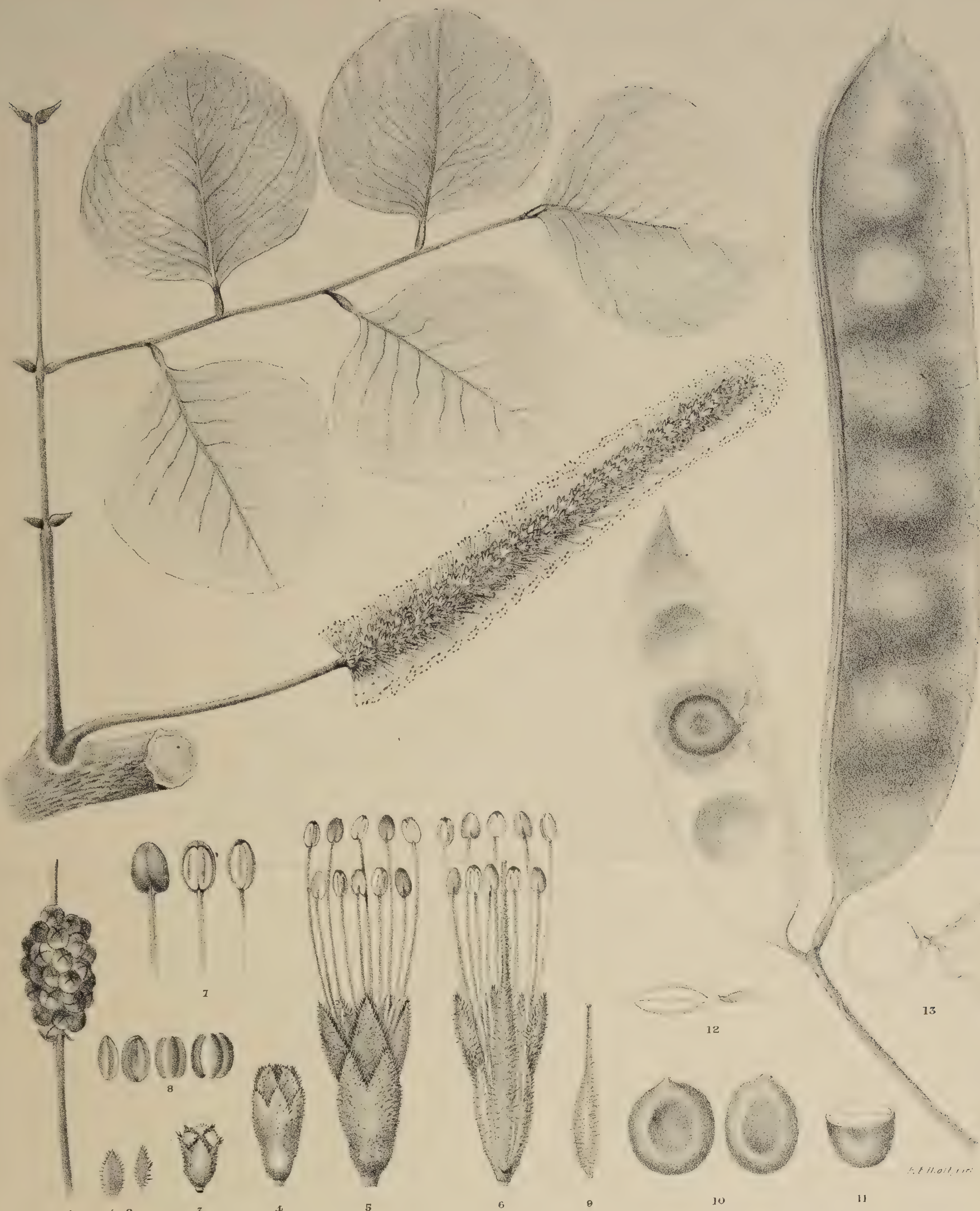
Several kinds of dressing are used which have their admirers and advocates, and, with a view to comparing the efficacy of each, the writer has arranged to test several treatments in one vineyard badly affected with blackspot last year, and the results will be published in this *Journal*. For the present, however, until something better turns up, the wash composed of 1 lb. of sulphuric acid to 1 gallon of water is recommended as having proved very successful in Europe and Australia. The acid should be poured into the water (and not *vice versâ*) in a wooden vessel by preference; but the wash can be made up in an empty kerosene can, so long as it is not allowed to stand in it for any length of time, or else the metal will be corroded. The solution should be applied with a large brush, and all parts of the vine, especially the spurs, well wetted. Decortication of old vines beforehand assists its efficacy. The best time to apply the dressing is on a cloudy day, but, if that is not obtainable, apply towards evening, the object being to prevent the dressing drying too quickly.

The most important point of all, however, is the period *when* to apply it, and, unless the dressing is put on at the right time, it might just as well be emptied on the ground, for all the good it would do. The right time for using the dressing is *just before the buds swell*. As this varies in different parts of the colony, no date can be given here, but vignerons, from their own experience, will know when that occurs, and act accordingly.

THE CAMPHOR MONOPOLY IN FORMOSA.

The editor of the *Kokumin Shimbun* sends us (*Brisbane Courier*) a carefully-prepared monogram on the camphor monopoly in Formosa. The chief camphor-producing locality for the world's markets is Formosa, and this seems to be the first reason which awakened in the mind of the present Formosa administrators the hope of making it a Government monopoly. The reckless destruction of the trees, and the great fluctuations in the price of the article, and the lack of uniformity in its quality, was the second reason for creating the monopoly. The Government has instituted strict forest regulations, and by wise forest administrations Formosa is safely capable of supplying the world with 6,000,000 or more pounds (English) of camphor annually. An established quality of camphor is ensured by strict inspection, and the Government has fixed the price of camphor to be sold, and retains the right of supervision and control over the selling price of camphor in foreign markets by the holder of the monopoly. Tenders for the lowest price of sale in foreign markets were invited from all merchants, native as well as foreign, and on 24th March last year, the monopoly of sale in foreign markets was secured by Mr. T. Arai, of Samuel Samuel and Co.

Plate XIV.



ERYTHROPHLŒUM LABOUCHERII, *F. v. M.*

Botany.

PLANTS REPUTED POISONOUS TO STOCK.

By F. M. BAILEY, F.L.S.,
Colonial Botanist.

IRONWOOD TREE, OR LEICHHARDT'S LEGUMINOUS IRONBARK (*ERYTHROPHLŒUM LABOUCHERII*, F. v. M.).

Plate X.

This is usually met with as a small tree of stunted growth. The foliage is not very dense, but usually extremely dry and harsh, and not at all likely to offer a tempting bite to sheep; nevertheless, during the last few years such seems to have been the case, and thousands of deaths have been the result. At first one might doubt the possibility of such large numbers being poisoned, thinking that the foliage would be far out of the reach of sheep, but from all accounts this tree has the habit of sprouting up from the roots and forming numerous leafy shoots near the ground. The accompanying illustration is from Baron von Mueller's work on the Australian Acacias and allied genera. A botanical description and further information may be found in Part II. of my Queensland Flora.

Mr. D. J. Nelson some few weeks ago sent specimens of Ironwood-tree to his father, Sir Hugh M. Nelson, with a report that he suspected this plant to be the cause of deaths of a number of sheep, and in a letter to me, dated 26th June, he states: "Further experience has convinced me that Ironwood is the poison which has caused the death of our sheep on the Woolgar and in this locality (Bylong, 10 miles west of Cambridge Downs head station). Our sheep are being shepherded on this selection, on which Ironwood occurs in large and frequent patches. As sure as we allow them to go amongst it we lose sheep. On examining the stomachs of several poisoned sheep we found Ironwood leaves, undigested and sometimes *quite whole*, not having been chewed at all. The immediate effect on the animal is to make it stupid and sometimes quite blind. Evidently great pain is caused, as it keeps moaning continually. Constipation occurs, followed by scouring, and if the sheep survives the latter it may recover. The suckers of the Ironwood, which grow from roots or stumps left from a bush fire, have the appearance of shrubs, and are easily accessible to sheep. Moreover, sheep pick up and eat leaves which fall from high trees.

Mr. Nelson also mentions that another station in the district is supposed to have recently lost 10,000 travelling sheep from Ironwood poisoning. Stock Inspector Crank wrote to me in May last informing me of this loss, and sent specimens of Ironwood, which he said was suspected as the cause of death. He also stated that two leaves were said to kill a goat.

According to Baron von Mueller, this tree contains *Erythrophlœin* the active principle of *Erythrophlœum guineense*, a native of West Tropical Africa, the bark of which is a powerful poison.

NOXIOUS WEEDS.

By F. M. BAILEY, F.L.S.,
Colonial Botanist.

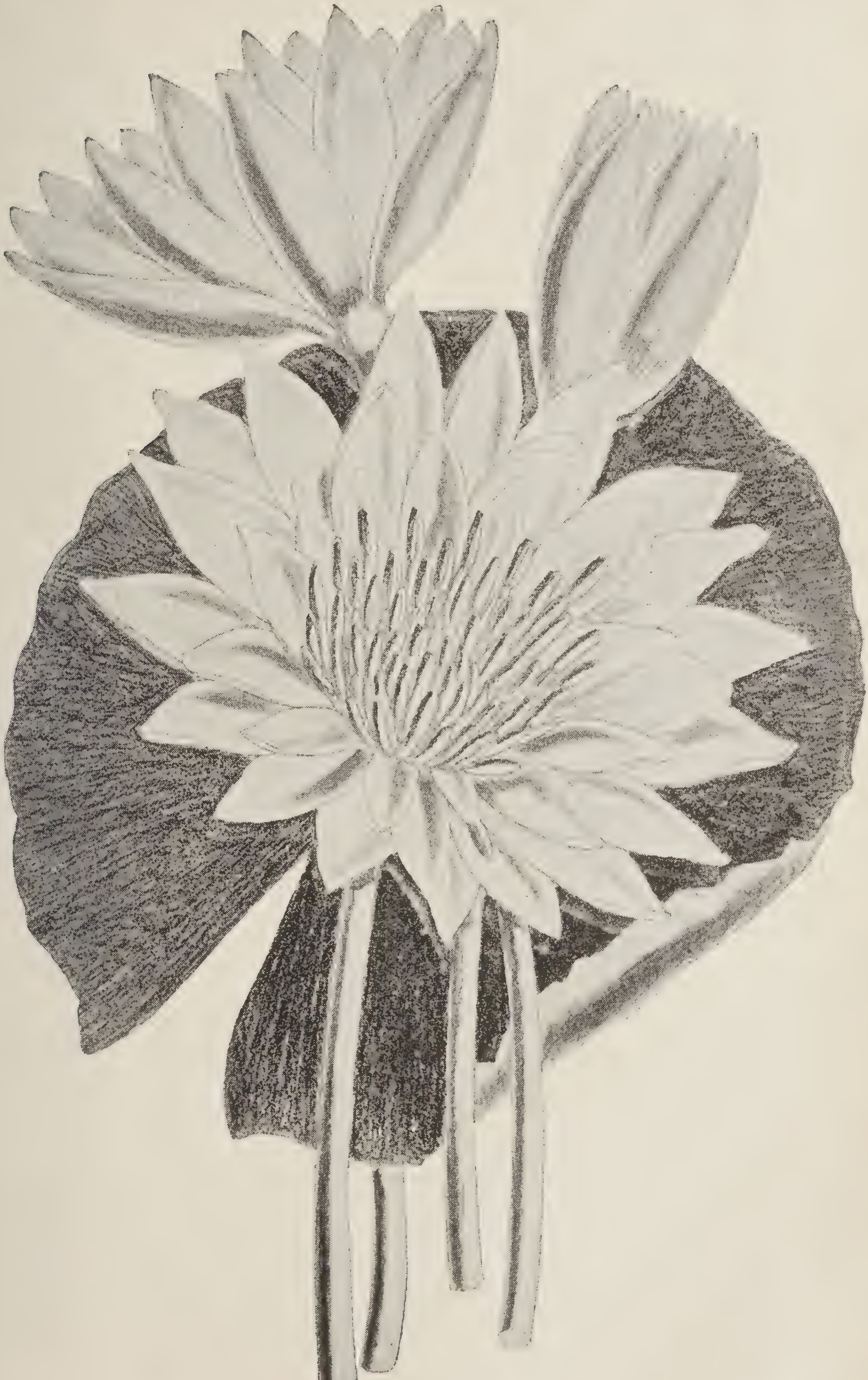
YELLOW WATER LILY (*NYMPHÆA FLAVA*, Leit.).

Plates XI. and XII.

This beautiful Florida water lily was introduced into this colony by the Queensland Acclimatisation Society without name about fifteen years ago, and was planted out in one of the ponds at Bowen Park, where it soon took full possession of the pond, smothering all the other aquatics. The beauty of its flowers has induced several persons to introduce it into the natural waters near their dwellings, and by these means several of our creeks are becoming choked up with it. Where it is desirable that watercourses should be kept open, the plant under notice should on no account be allowed to obtain a footing, for it

would not be easy to eradicate after it had once become well established in the water, as one may imagine from a glance at the accompanying diagram of the rootstock, which, with the plate showing a portion of creek near Brisbane where the plant has become established, make it unnecessary to give any further detailed description. It may be well to point out that from the character of the rootstock of this water lily it is more likely to become troublesome than the floating plant known as Water Hyacinth, of which some persons seem afraid. The illustrations on Plates XI. and XII. are from the *Botanical Magazine* and *The Garden*. For botanical description see Part I., page 39, of my Queensland Flora.

Plate XI.



NYMPHÆA FLAVA, Leit.

Plate XII.

NYMPHÆA FLAVA, Leit.

THE MEDICK BURR.

We have received from Mr. E. W. Hillgard, Director of the Agricultural Experiment Station of the University of California College of Agriculture, the subjoined remarks on an article on the Burr Clover (*Medicago denticulata*) by Mr. F. M. Bailey, Government Botanist, in the March issue of this *Journal*. Mr. Hillgard's experience of the plant would appear to be quite the opposite of the experience of farmers and graziers in this colony. He says:—

I note in your March issue some statements regarding the Burr Clover (*Medicago denticulata*) which are so contradictory of California experience that I desire to call attention to them, as possibly referring to some other species.

There is no question about its injury to fleeces; it is also true that it is not very readily eaten by stock when green on account of its bitterish taste. But of its nutritive qualities, there can be no question, as our analyses show; and as it will grow on dry clay soils where most other forage plants would fail, it should not be lightly discarded.

The statement, that "after it dies down there is nothing left for pasture," is very surprising, for its abundant pods, sometimes covering the ground to the depth of 1 inch or more, are among the most important ingredients of our "dry pastures," keeping cattle in good condition during our summer drought. Moreover, the luxuriant growth it makes during mild winters, makes it with us a valuable green-manure plant.

During our driest seasons a second generation of burr clover will come up on cultivated ground, and form small wheel-shaped plants literally covered with the nutritive burrs; and if these plants are not destroyed, an orchard or vineyard can have a valuable green-manure ploughed under in spring.

When a "weed" can be made useful, it is a great acquisition, as its hardiness enables it to succeed when most culture plants fail.

Mr. F. M. Bailey, to whom we submitted Mr. Hillgard's letter, says:—

Re letter from Mr. E. W. Hillyard on Medick Burr (*Medicago denticulata*):—

"For the 'character' of this plant I would advise you to refer to some of our farmers. From my experience of it in Queensland I should never recommend it as a fodder or for grazing purposes, and most certainly not in dry localities, for it possesses no drought-resisting qualities.

"I know nothing about the value of the seeds of this plant for stock food, but far more valuable kinds of pulse are or might be grown in the colony, which have the advantage of not, at any period of their existence, becoming pests."

As to the depth to which the seed is stated to cover the ground, Mr. Bailey is sceptical on the point, not being acquainted with any small plant the pods of which would cover the ground to the depth of an inch.

DESTRUCTION OF THE WATER HYACINTH.

We have persistently warned horticulturists and others of the dangers attending the planting of the Water Hyacinth. In his excellent paper on "Some Pests" read by Mr. L. Corrie, at the Warwick Conference, he denounced the introduction of certain plants as a crime—and rightly so. To perpetuate this beautiful but pernicious water plant would be nothing short of a crime against the whole community, and it should be looked upon as one punishable by a heavy fine. We have pointed out the disastrous effect it has had in Florida (U.S.), and have no desire to see our inland rivers and lagoons ruined by its spread. We now learn from the *Scientific American* that the plant has been successfully killed on the Melpomene Canal, New Orleans, by the application of a chemical spray, but no details of the process have yet reached us.

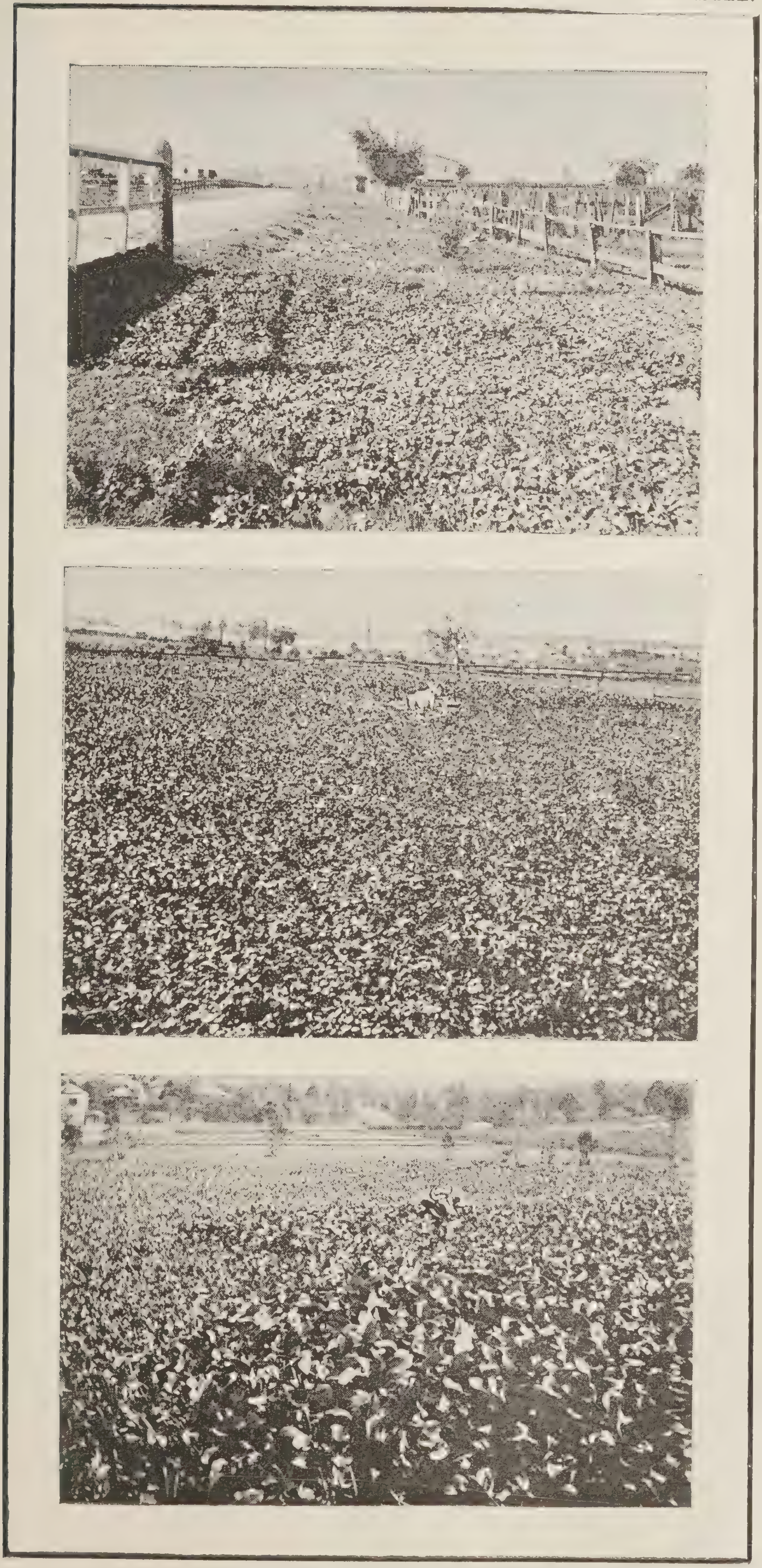
Notwithstanding all that has been written in the Press in America, England, and Australia demonstrating the great injury to river trade caused by the phenomenal spread of the water hyacinth, there are many people in this colony who still maintain that there is no danger of any trouble arising here from its presence in our lagoons and rivers. We have before shown how it chokes out every other species of aquatic plant, and in a very short time covers the whole surface of the water with its vast masses of compact stalks and leaves. Not being rooted in the soil, the plants thickly matted together float backwards and forwards within the influence of the tides, and continue to spread until what was formerly a navigable creek or river becomes a solid mat of vegetation through which no boat, raft, or steamer can force its way. Should any portion become detached and float down with the tide to the salt water, it is destroyed, as salt water is fatal to it. When it is about to bloom, it sends its roots into the soil, if near the bank or in shallow water, and thence it will spread rapidly over lowlying paddocks, choking up the waterways on the roadsides, and so causing great damage to the roads themselves. We have made inquiry as to where the hyacinth is to be found in Queensland, with the result that we find there are few districts where it has not taken hold. Our artist also made a tour of discovery, and found that it exists in greater or less quantity all over East and West Moreton, notably in the Bremer and Upper Brisbane River. It is also to be found at Laidley and other places in the neighbourhood of the Laidley and Lockyer Creeks. It has been carried to the Central and Northern districts.

Mr. Leslie G. Corrie, in the paper abovementioned, clearly points out the great danger ahead owing to this water pest; and as all those who receive the *Journal* will also receive the Supplement to the July issue, or Conference number, we earnestly advise them to read Mr. Corrie's remarks, and to at once take steps to thoroughly eradicate the hyacinth wherever they find it growing in their neighbourhood. Our illustrations will serve to show how the evil has already spread in the neighbourhood of Brisbane.

SUGAR AS A MEAT PRESERVATIVE.

There is nothing new in the idea of employing sugar instead of salt as a preservative for meat. We have in past years had frequent opportunities of noting the effects of sugar on hams. The hams were placed in a pickle, if we may so call it, of sugar and molasses. The fresh hind-quarters of the pig were first well rubbed with powdered sugar, and were then placed in the saccharine solution and left undisturbed for some weeks. When cooked, the meat did not present the red and white appearance of the brine-cured article, but more resembled fresh pork. Yet the taste was precisely the same as that of ham, albeit a little sweeter. In connection with this, we learn that experiments have been made, under the direction of the French Minister for Agriculture, which demonstrate that sugar is a good agent for meat preserving, and possesses some advantages over salt. It is pointed out that the latter absorbs a portion of the nutritive substances and of the flavour of the meat. When an analysis is made of a solution of salt dissolved by water contained in meat, albuminoid bodies, extractive substances, potassa, and phosphoric acid are found. Salt deprives meat of these substances so much the more readily in proportion as it enters the tissues more deeply or acts for a longer time. The result is that the meat, when taken from the saline solution, has lost nutritive elements of genuine importance. Powdered sugar, on the contrary, being less soluble, produces less liquid. It forms round the meat a solid crust, which removes very little water from it and does not alter its taste. Thus preserved, it is sufficient that the meat is immersed in water before using it. The report declares that although this treatment costs a little more than preservation by salt, account must be taken of the final result and of the loss prevented, which offsets the difference in cost between the two preservatives.

Plate XIII.



WATER HYACINTH, O'CONNELLTOWN, BRISBANE

Plate XIV.

WATER HYACINTH, CHELMER, NEAR BRISBANE.

Tropical Industries.

PEPPERS OR CHILLIES.

Why should not Queensland enter upon the production of chillies on a commercial scale? The capsicums grow luxuriantly in all parts of the coast country, and bear fruit almost all the year round. Their cultivation affords far less labour than the cultivation of cereals, sugar-cane, or, indeed, of any other farm crop except Sisal hemp. The plants should be set at a distance of 4 feet in the rows, and from 5 to 6 feet between the rows. They will grow on almost any kind of soil, but prefer a dry, rocky soil with sandy loam, containing some lime. It is difficult to arrive at a correct estimate of the yield of dried capsicums from a well-grown shrub during the year. Some estimate the annual return at 2 lb., others say that 3 lb. and even 4 lb. may be reckoned on. The selling price of dried chillies in the London market varies from £18 to £34 per ton according to quality—for instance, in April, 1899, fair red Zanzibar sold at 29s. 6d.; good red Japan at 33s. 6d. to 34s. per cwt. The present wholesale price in Brisbane for dried chillies is 1s. per lb., equal to £112 per ton. A sample of capsicums grown in the West Indies, dull and uneven in colour, was valued at 20s. per cwt. What is evidently required is an article bright in colour, even in quality, and possessing great pungency.

The Government Botanist has received a sample of a large red, sweet capsicum dried in such a manner that the skin is perfectly transparent and the seeds inside are quite dry, and can be shaken like the dried peas in a "rattle-pod." We have no information as to how the specimen was dried, whether naturally or artificially, but the pod was certainly not opened previous to drying.

A consignment of capsicums prepared in this manner would, no doubt, bring a good price in the English market. Another enticing method of preparing chillies for export is to bottle the long red variety in a solution of salt and water. This preserves the shape and colour of the fruit, and gives it a very attractive appearance.

The *Bulletin of the Botanical Department*, Jamaica, says on the subject of chillies:—"Pod peppers or capsicums, the fruits of *Capsicum annuum* and allied species, are a well-known spice and condiment. They are an indispensable ingredient in curries, and are largely consumed in the fresh and dried state and in pickles. Some forms of capsicum known as Bell peppers are entirely free from the acrid and burning pungency so characteristic of these fruits, and may be eaten cooked as a vegetable or in salads.

Chillies, Bird or Guinea Peppers, the fruits of the shrubby *Capsicum minimum* (usually much smaller than the preceding) grow generally in tropical countries. These are in chief demand in commerce. When thoroughly dried and pounded, and afterwards passed through a hand-mill and sifted, they are the principal source of the well-known Cayenne pepper.

It is estimated that about 100 tons of dried chillies are annually received into England from the West Indies and the East and West Coasts of Africa.

In the Kew Bulletin (1892, p. 88) the following information respecting chillies was given in an article on the agricultural resources of Zanzibar, contributed by Sir John Kirk:—

"The small red peppers, or chillies, are largely grown in the more dry and rocky part of the island, where the upheaved coal presents a honeycombed surface that favours the accumulation of rich soil in the crevices. The pods are picked when ripe, sun-dried, and packed in neat bags made of the split fronds of the *Hyphæne* palm for shipment. This is an industry that has sprung up within the last thirty years."

Zanzibar chillies, as they appear in the market in a dry state, are small, red, thin, carrot-shaped fruits about 1 inch in length.

The following further particulars are contained in a report on the spice and other cultivation of Zanzibar and Pemba (F. O. Report, 1892, Misc. Series, No. 226):—

"The pepper plant growing in the island is *Capsicum minimum*, usually termed the 'shrubby capsicum,' and producing the bird's-eye chillies forming the basis of cayenne pepper. This is to be found in a small degree in every shamba, but the principal source from which the annual exports are derived is the eastern side of Zanzibar, and the cultivation here is chiefly in the hands of the Wahadinu people.

"Judging from observations made during my brief visit to this portion of the island, east of Dunga, the chillie cultivation struck me as being of a very scattered nature, generally small isolated patches from half to 1 or 2 acres in extent, and combined with tobacco, tomato, pumpkins, &c. I regret my inability to quote the annual total exports, but I believe they are large, and an undoubted source of revenue. As the chillie is, as yet, the only product of any value grown in this less favoured portion of the island, I consider that this cultivation could be extended, and that a little fostering care might be productive of much advantage. It is a cultivation easily carried on, and calling for no special trouble or skill, and the returns are certain and profitable. At present the people are so blind to their own interests as to purposely depreciate the value of this product. I understand, through fear of possible shortage by theft on the way down, owners actually damp the chillies before despatching, and it is often necessary, on their reaching the Government Customs godowns, to dry them as quickly as is possible as the only chance of saving them.

"Another variety of pepper (? *Capsicum annuum*) bearing a larger red and yellow pod is also cultivated, but the produce from this is all consumed locally."

The latest account of Zanzibar chillies is contained in the report of Mr. Consul Cave, on the trade and commerce of Zanzibar, for the year 1897 (Foreign Office, 1898, No. 2129 Anual Series):—"The production of chillies has risen from 16,336 frasilas in 1896 to 17,698 frasilas in 1897, an increase of 77,670 lb. The average price was 2 dollars 37 cents per frasila, as against 2 dollars 57 cents per frasila during the previous year.* A better price than this could doubtless be obtained for Zanzibar produce if a little more care and attention were devoted to its cultivation and harvesting, but up to the present time it has been allowed to grow almost wild on the coral outcrop which covers the eastern portion of the island, and the slight personal discomfort which attends the handling of pods prevents the native from exercising any care in its picking and subsequent preparation for market. Attempts have lately been made to obtain a better sample on ground which has been specially cleared and prepared for the purpose, but the results are not yet to hand."

JAPANESE CHILLIES.

In a note on Recent Additions to the Museum of the Pharmaceutical Society (*Pharm. Journal*, 11th December, 1897), Mr. E. M. Holmes, F.L.S., furnished the following interesting particulars, at an evening meeting of the society, respecting Japanese and other chillies:—

"During the last three or four years there has been in commerce a very bright red variety of *Capsicum minimum*, Roxb. (*C. fastigiatum*, Bl.), said to be imported from Japan. In consequence of its clean, bright, and attractive appearance, it has commanded a higher price than other varieties. Mr. J. C. Umney has recently directed my attention to the fact that this variety is less pungent than the Sierra Leone and Zanzibar varieties, although far superior to them in colour. On further inquiry I find that this fact is well known to drug and spice brokers. Mr. Umney points out that when an alcoholic tincture of either the Japanese or Zanzibar varieties is diluted with about 14 parts of

*A frasila = 35 lb. avoirdupois.

water, the former gives a much clearer solution than the latter, indicating less oily matter. All the bright red Cayenne pepper until recently in commerce is said to have been imported from Natal in that state. The entire pod pepper imported from Natal is a variety of *Capsicum annuum*, much larger than the chillies, and of a dark red colour and very pungent, whereas the powdered Japanese and Natal Cayenne peppers, placed side by side, are indistinguishable in point of colour. The other principal varieties of chillies at present in English commerce are, I am informed, those of Sierra Leone and Zanzibar, the former being of a yellowish-red tint, and the latter of a dull, dark red, and often of inferior quality, containing badly dried fruits, stalks, and foreign matter, but both are more pungent than the Japanese kind. The latter is, however, quite pungent enough for most people, although perhaps unsuitable, by reason of its lesser pungency, for medicinal purposes, as an outward application, &c. I am indebted to Mr. Young, of the firm of Messrs. Dalton and Young, for information concerning the different commercial varieties and for specimens illustrating them. My object in directing attention to these commercial varieties is to point out to students and to retail chemists that there are often differences in the qualities and appearance of the same drug, which are worthy of careful observation, not only from a scientific, but from a commercial point of view. Nepal Cayenne paper is made from a small variety of *Capsicum annuum*, and is remarkable for its violet odour. Neither this kind nor the Zanzibar gives a red, but a brownish, powder.

The following comments on Mr. Holmes' paper were made at the meeting by Mr. MacEwan:—

"The subject of cayenne pepper was interesting to many chemists quite apart from medicinal purposes, probably more capsicum being sold for feeding birds than for any other purpose. The pepper used in that way was tasteless, and seemed to contain a large amount of fatty matter. It was dark in colour, and the object was to heighten the colour of the feathers. It was supposed to come from *Capsicum annuum*, and he should much like to know where it came from. It was only supplied by two or three houses, and attempts by others to obtain it had not been very successful. There was no doubt that the pepper as used was an untreated product. The late Dr. Brady, on his return from Japan, passing through Vienna, came across a comparatively tasteless pepper, which caused considerable discussion at the time, as there was a large amount of it on the market, but the substance had been pretty much lost sight of since. He thought it would well repay inquiry, as very little had been done on the subject of peppers since Dr. Thresh dealt with it about eighteen years ago."

According to a writer in Spons' "Encyclopædia," Div. V., p. 1803:—

"Several varieties of *C. annuum* have little or no pungency; one of these is abundantly grown in Hungary, forming the paprika of the Magyàrs. Another variety, cultivated in Spain, is imported into this country in powder for giving to canaries, to improve the colour of their feathers. The Nepal capsicums, which have an odour and flavour resembling orris-root, are the most esteemed as a condiment."

SOUTH AMERICAN PEPPERS.

The following interesting account of the use of peppers in South America appeared in the *Saturday Review* of the 15th September, 1886:—

"*Aji-aji.*—Pepper of peppers is the meaning of this compound Quichuan word, and both word and thing are largely distributed over South America, extending from the Bibo-Bio in the south to the Atrato in the north; it is also found in the dialects of the Gran Chaco; in Aymara, in Andaqui, among the agricultural Indians of Chocò, the mining Indians of Potosi, and Cerro de Pasco. . . . .

"There are two kinds of aji; but there is only one way of preparing it. The best is that which is made from the greatest variety of peppers. The

pods of these are taken when fresh, stripped of their seeds, and ground into a paste of the consistence of fresh spring butter. The paste is put into a small, well-dried gourd, prepared on purpose, of the size and shape of a well-grown orange.* The gourd, when thus charged, is then coated with a layer of well-tempered clay, and placed in the sun to dry, or to ripen, as the simple people who prepare it say in their own tongue. By the time when the clay is well baked, the pulp or paste within has been dried into a fine yellow powder, and is then fit for use. Many people, ignorant of this fine art of the Incas, have supposed, quite naturally, that these aji-laden gourds, with their exquisite flavour and refined taste, were some uncommon and little-known natural fruits. The other method of preparing aji is to grind the seeds with the pods, which simply adds great pungency to the pepper, and is always used in the preparation of maize, or Indian corn, which is boiled in its own husk with much aji, and surpasses in flavour and pleasantness any vegetable curry of the East. The gourds of aji, when thoroughly ripe, are cleansed of their coating of clay, tied up in suitable leaves, well secured by the fibre of the aloe, and much resemble when ready for market reeves of large onions, a dozen gourds making up one reeve of aji. The cost of these in the good old times was 1s. 3d. for a dozen gourds; what the price may be now is only known on the exchange. Time was when some of the old families of the interior who had passed their lives in ignorance of railways, daily newspapers, and quotations of the state of the markets, had their own special way of preparing aji, mixing with it some delicately scented bark ground to powder, or other salutary substance known only to the reticent Indian. From such houses no visitor was ever allowed to take his departure without carrying with him a supply of the latest-made aji; no traveller went to the capital or any of the coast towns, but he carried with him some of this excellent pepper as a present to the archbishop or bishop of the diocese, the ladies of Santa Rosa, or the good Fathers who once a year went long journeys to baptise the children, marry their parents, and otherwise maintain the influence and authority of the Church in the remote parts of the earth. But even this good custom is fast dying out."—*Kew Bulletin.*

Specimens of these gourds are in the Kew Museum, labelled "Gourds used in Chile for holding red pepper 'aji' (*Capsicum* spp.), from Mr. H. F. Stahlschmidt, 1885."

RISE OF THE SUGAR INDUSTRY OF JAVA.

Under this heading the *Journal des Fabricants de Sucre* prints an account of the extraordinary conditions of sugar production in Java. According to an official report, the production for the last three years has been as follows:—

Year.	Factories in Operation.	Production in Tons.
1896	187	534,390
1897	188	586,299
1898	188	725,030

Java, therefore, produces as much sugar as France, with a number of factories of less than one-half.

The astonishing part, however, is in the yield obtained per acre. The figures are these:—

Year.	Cane per hectare in kg.
1896	76,900
1897	85,400
1898	98,700

The yield of beets in Europe is about 25,000 to 30,000 kg. per hectare on an average.

If the foregoing figures are astonishing, the following are simply fabulous. They represent the sugar per hectare in Java:—

Year.	Sugar Extracts per hectare in kg.
1896	8,100
1897	8,600
1898	10,100

Compare these figures of 8,000 to 10,000 kilogrammes per hectare to those of Germany, where they have only 4,000 kg.

On the other hand, the yield in the factory went lower than Java. The amount of raw sugar extracted from the sugar-cane by weight was as follows:—

Year.	Yield in per cent
1896	10·55
1897	10·06
1898	10·21

The factories which obtained more than 10,000 kg. of sugar per hectare were only 11 in number in 1896, in 1897 they numbered 30, and in 1898 they had reached the number of 87.

Die Deutche Zuckerindustrie says in connection with this subject: "This enormous superiority of the cane-sugar industry over the beet-sugar industry would increase still more if the bounty was taken off. The only possibility of keeping up the fight against so privileged a competitor rests in the value added by the bounty to the products of the beet. If by the abolition of the bounty the cane-sugar and the beet-sugar industries were placed on an equal footing from the point of view of realising on their products, the fate of the beet-sugar industry would be sealed. And in considering the foregoing results, one speedily acquires the conviction that the progress of the colonial industry is far from having reached its highest point, whereas one hardly perceives any noteworthy progress to be realised in agriculture and manufacturing in Europe."

The French paper agrees with the idea that the development of agriculture and industry in certain countries affords grounds of apprehension for the beet-sugar industry of Europe, but it differs as to the future of the latter. It believes that under the stimulus of necessity it will make great progress and reduce the cost of production so materially that it will have a long series of years of successful existence.—*Planters' Monthly*

COFFEE TEA.

Those who know that cheroots can be made from sunflower leaves will scarcely be surprised when informed that coffee leaves yield a grateful and refreshing "tea." According to a Calcutta paper, coffee tea is the only non-intoxicating drink the Sumatran believes in, and his faith is founded on experience. On a little boiled rice and plenty of coffee-leaf tea, he works for weeks together in the ricefields up to his knees in mud, scorched by a burning sun or drenched with tropical downpours. Heat, cold, and wet are alike to him, for they work him no harm, and he ascribes his immunity entirely to the virtues of his favourite beverage. We are even informed that, although in Sumatra coffee trees grow everywhere near the houses, the berries are not used, and are found lying on the ground decaying, not being worthy of consideration. The liquor of the coffee-leaf is said to smell like green tea, and to be pleasant to drink and very refreshing. It is therefore not a matter for surprise that the inhabitants of Sumatra display a fondness for what is truly their national beverage. They drink it morning and evening, and find it invaluable in giving immediate relief to hunger and fatigue. And cultivation under these circumstances is no longer a matter of difficulty or anxiety. The *I.P.G.* proceeds as follows:—

"When grown for its berries, the coffee plant can only be cultivated successfully in particular soils and particular situations; but when it is only

required to yield a good crop of leaves, it can be profitably grown wherever the soil is tolerably fertile. The Sumatrans consider that the best liquor is obtained from the leaves shed by the plants, but their usual method of procedure is to take off the ends of the branches and suckers, and break them up into 12 or 15 inch lengths. These are fixed side by side in a split bamboo, so that the leaves all appear on one side and the stalks on the other, by which means equality of roasting is ensured, the leaves being roasted together, and the stalks together. After tying up the bamboo, the truss of leaves and stalks is held over a smokeless fire, and kept moving about, so as to roast without singeing it. The stalks are considered quite as valuable as the leaves; and when the operation is completed, leaves and stalks are rubbed between the hands into a coarse powder, and then they are ready for use. Analytical chemists have pronounced coffee-leaf tea to contain all the characteristics of the coffee bean, while richer in theine. The infusion is of a deep brown colour, and extremely fragrant; its odour, like its taste, resembling that of a mixture of tea and coffee. Dr. Stenhouse, a well-known authority, says that the infusion of the coffee leaf has a much greater resemblance to that of tea than to a decoction of the coffee leaf; so that, should the coffee leaf ever come into general use in European countries, it will be rather as a substitute for tea than for coffee. If the leaves were only dried at a somewhat lower and better regulated temperature, they would yield an agreeable beverage. It would be interesting to know whether any of our readers have ever tried the experiment of making tea from coffee leaves. If so, with what result?"—*Planting Opinion.*

We have often tasted coffee-leaf tea, and it may be described as a pleasant refreshing beverage.—Ed. *Q.A.J.*

COMPARATIVE ANALYSES OF TOBACCO.

The subjoined analyses of Dark Virginia and Queensland Texas raw leaf made by Mr. J. C. Brünnich, chemist to the Department of Agriculture, has been handed to us by Mr. R. S. Nevill, tobacco expert, for publication.

Mr. Nevill remarks:—"The Queensland tobacco, it will be seen, compares very favourably with the American, and I do not think, to judge by the analysis, that the production of excellent Queensland tobacco presents any difficulties that cannot be overcome. It should be borne in mind that different localities often show a modification of the same product, and the comparatively lower nicotine content, as here shown, does not materially affect the position of the Queensland-grown leaf."

COMPLETE ANALYSES OF TOBACCOS.

	Dark Virginia Raw Leaf. Per Cent.	Queensland Texas Raw Leaf. Per Cent.
Moisture	9·44	10·48
Nicotin	4·52	2·54
Ammonia	·53	·07
Nitric acid	·83	1·05
Malic acid	12·05	10·72
Citric acid	2·81	4·55
Oxalic acid	3·18	3·64
Acetic acid	·55	·79
Tannic acid	1·80	1·50
Pectic acid	7·18	9·55
Pectose bodies and gums	3·61	4·55
Albuminoids	11·92	12·20
Other insolvent organic matters (diff.)	6·87	10·35
Cellulose	10·22	7·95
Oils, fats, chlorophyll	5·90	4·16
Resins	4·51	2·87
Starch	·64	·58
Total pure ash	13·64	12·45

COMPLETE ANALYSES OF TOBACCOS—*continued.*

	Dark Virginia Raw Leaf. Per Cent.	Queensland Texas Raw Leaf. Per Cent.
Ash containing—		
Silica and sand	3·78	1·60
Phosphoric acid	·38	·56
Sulphuric acid	·56	·47
Chlorine	·74	·52
Lime	3·94	3·59
Magnesia	1·04	·91
Iron and alumina	·46	·44
Potash	2·60	3·79
Soda	·13	·57
The tobaccos contained—		
Total nitrogen	2·753	2·410
Amido nitrogen	·616	·812

SISAL GRASS IN MEXICO.

Mr. Edward H. Thompson, H.B.M. Consul at Progress, Mexico, furnishes the following interesting information concerning the culture of sisal hemp in that country to the *Planters' Monthly* :—

Henequen; "jeniquen," Spanish; ci, Maya; "sisal grass," commercial term; *Agave sisalensis*, scientific term.

This plant has been in use among the ancient inhabitants of Yucatan from the earliest times. The writer has found it imbedded in the form of cord in the stucco figures that ornamented the façades of the mysterious ruined cities of Yucatan. There are two wild varieties of henequen, called by the natives "cahum" and "chelem." The fibre of these wild plants is used to some extent by the natives in the making of cordage for domestic use, and some claim that hammocks made from the fibre of the cahum are the best.

It is, however, the cultivated plant that furnishes commerce with the fibre known as sisal grass, Sisal being the old port from which the fibre was first exported.

Like the wild plant, the cultivated one is divided into two varieties—the "zacci" or white hemp, and the "yaxci" or green hemp. The zacci is considered the finest and best, but the yaxci is a good fibre; and by the time the henequen fibre reaches New York or Boston, it is simply as sisal grass, of a good or medium quality, as the case may be.

It has been generally supposed that sisal grass as an article of commerce has been known only within the last fifty years. This is a mistake.

Between the years 1750-1780, quite a *furore* was created in commercial countries of the Old World by the discovery that the fibre of a plant found in Yucatan was good for ship cordage. Spain sent over a royal commission to report upon the discovery, and in a few years many of Spain's commercial and war vessels were using cordage made from henequen. For some reason, probably because of the primitive method of preparing it, the use of the fibre gradually declined until, at the commencement of this century, the former trade had been forgotten.

In 1849, Yucatan, until then a cattle-producing, cotton-growing, and logwood-exporting country, was in the throes of an Indian war. The Maya Indians had risen in rebellion, and had succeeded in driving the white race out of the most fertile portions of the peninsula, forcing them to rely for means of subsistence upon the products of a sterile, rocky belt, too poor to sustain cattle in any numbers.

Henequen was the only useful plant that would grow on such a soil. The first plantation, so far as I can learn, was planted in 1848, and the 50 acres planted were cleaned by the use of the tonka, the primitive cleaner used by the native Maya. There was a good demand for the new fibre in ship rigging, and it gradually came into general use, until sisal was a well-known article of commerce. The tonka was a piece of hard wood, shaped something like a hand saw, having the end curved in. The leaf of the henequen was drawn through the sharp curve, and the fibre was stripped of the thick, pulpy covering. The leaf was subjected to this operation two or three times, until the fibre was left clean and free. This tedious process was not long tolerated. A machine was found to increase the output, but the demand again outgrew the means of supply. Then the machine known as the "raspador," or the "solis," from its inventor, came into use, and has held its own almost up to the present day. It consists of a large-toothed wheel that scrapes the pulp and leaves the fibre. Its simplicity made it peculiarly fitted for use by the native servants. Plantations came to be known as plantations of one, two, or a dozen wheels.

The constantly increasing trade necessitated still more rapid means of fibre cleaning. Many new machines were produced, each of which was said by its inventor to be far better than any of the others. To-day, the following machines are in actual use in Yucatan :—

Hemp-cleaning machines now in use upon the plantations of Yucatan :—

Machine.	Number of Leaves Cleaned in Ten Hours.	Actual Horse-power.	Number of Men needed.	Cost of Machine.		Number in use.
				*Mexican.	United States.	
Lanaux	130,000	35	3	$6,000 00	$2,856 00	6
Prieto	125,000	60	3	7,000 00	3,332 00	90
Stephens	150,000	70	3	11,000 00	5,236 00	6
Solis	9,000	6	2	250 00	119 00	1,200
Torroella	80,000	30	3	5,000 00	2,380 00	20
Villamor	70,000	35	3	6,000 00	2,856 00	...

NOTE.—Compiled from data given me by the inventors themselves or their authorised agents.

I give below a table showing the exportation of sisal grass from Yucatan during the ten years ended 31st December, 1898 :—

Year.	Bales.	Quantity. Kilograms.	Lb.
1889 ...	243,968 ...	40,641,521 ...	89,598,297
1890 ...	260,106 ...	45,079,423 ...	99,382,096
1891 ...	310,090 ...	52,065,024 ...	114,782,552
1892 ...	353,525 ...	58,584,813 ...	129,156,078
1893 ...	355,123 ...	58,097,925 ...	128,082,685
1894 ...	373,883 ...	61,605,695 ...	135,815,915
1895 ...	381,504 ...	61,729,584 ...	136,089,041
1896 ...	397,163 ...	65,762,910 ...	144,980,911
1897 ...	419,975 ...	76,545,153 ...	155,523,844
1898 ...	418,972 ...	68,834,268 ...	151,752,027
Total for 10 years	3,514,309	582,946,316	1,285,163,448

The Mexican Government requires all weights to be stated in the metric system.

In 1888 and 1889, the price of hemp reached 15 centavos per lb. The cost of production was then about 4 centavos per lb.

* The United States Director of the Mint estimates the average value of the Mexican dollar in 1899 as 47·6 cents.

Exports of sisal grass from Yucatan during the ten months of 1889:—

Month.	Quantity. Bales.	Kilograms.	Lb.
January	52,128	8,735,545	19,258,383
February	21,360	3,506,832	7,731,162
March	58,069	9,621,703	21,212,006
April	43,530	7,075,447	15,598,530
May	30,869	5,015,166	11,056,435
June	31,629	5,133,882	11,318,156
July	26,937	4,296,939	9,473,032
August	26,204	4,202,208	9,264,188
September	44,973	7,456,101	16,427,725
October	35,595	5,695,200	12,555,638
Total for 10 months	371,294	63,739,323	140,519,711

Prices during these months have ranged from 15 to 18 centavos (7·1 to 8·7 cents).

It is said that the best fibre-producing plant grows on the poorest and rockiest soil; but this does not accord with experiments made by me, and, to my mind, is open to contradiction.

One method of planting and cultivating is as follows:—The field is first cut and burned off. The burning produces a certain amount of ashes, and many planters set out seed corn at the same time they plant the henequen. The one does not interfere with the other in the least, and the corn crop helps to pay the cost of the henequen.

The henequen plant is propagated, not by seeds, but by scions or suckers. The plant produces seeds, and in a natural state propagates itself by both seeds and scions; but the planter uses only suckers from 18 to 20 inches high. By this method, he can produce a field of henequen ready to cut within five years, whereas by seed planting he would have to wait from eight to nine years.

Once planted and properly tended—that is, cleared of weeds twice a year and not under or over cut—a field will last twenty years, and instances are not wanting of fields that have lasted longer.

A leaf is ready to cut when it extends at right angles to the trunk of the plant. A healthy, vigorous plant in the maturity of its growth should yield from eighteen to twenty-four leaves. One thousand leaves should produce from 50 to 60 lb. of good, clean fibre. This amount is a fair average.

When the plants in an old field send up a flower stalk, it is Nature's signal that the crop is finished. The old plants must then be clipped of all useful leaves and cut down, to allow the young scions (which should have been already planted between the old plants) ventilation for growth.

Bad cleaning, allowing rot to be produced by the acids nascent in the plant pulp, and dampness produce red or mould-stained fibre, of less than one-half the value of the good, clean, white fibre. This is rarely exported, but is sold at home for domestic use.

In March of last year, the preliminary trials of the machinery in the new cordage factory, La Industrial, gave satisfactory results. This factory was the first of its class established in Mexico, and its progress has been closely watched.

It is, in the opinion of experts, as completely equipped as any similar enterprise in the United States, and its total cost has reached nearly 700,000 dollars. The machinery is nearly all from the United States, and is of the best and latest pattern. The factory is now working double time in order to fill several very large contracts for binder twine from United States houses.

There are in Yucatan nearly 1,200 henequen-producing plantations of various sizes. The largest plantation, or, perhaps I should say, the plantation producing the largest output, is, I think, on the line of the broad-gauge railway between Merida and Progreso. It is called Ticilche, and produces at the time of this report about 1,000 bales, or 375,000 lb., of cleaned fibre per month.

Prophecies are dangerous, and I venture to make one with diffidence; but I have recently been over the henequen-producing belt, and have perhaps as much data as most persons. My belief is that if the maximum production of henequen in Yucatan for the next three years has not already been reached, it will not exceed this year's output by over 10 per cent. Many factors unknown in the United States are of importance here, and parties interested will do well to bear this in mind. I have no henequen interests, and my judgment may be the clearer for that fact.

EXTRACTION OF RUBBER.

A novel process was described recently before the Society of Civil Engineers of France for the extraction of india-rubber from the tree. The bark and roots are cut up and soaked in dilute sulphuric acid. The effect of this is to decompose the woody portions without affecting the india-rubber. In this way a division is made between the valuable rubber and the rest of the bark and roots, and it is claimed that the rubber so produced is quite pure. It was stated by the author that 1 lb. of india-rubber could be produced by the process at a cost of about 2½d.—*Engineer.*

NEW PROCESS OF RUBBER EXTRACTION.

Two French chemists have discovered a process by which rubber may be obtained from Landolfia vine, which grows wild and luxuriantly in all parts of Africa. The process of tapping the Landolfia is impracticable, as the flow of rubber hardens too quickly. By the process of M. M. Arnand and Verneuil, the vine is crushed in hot water, by which means all the rubber which it contains is extracted.

THE SUGAR SEASON.

The estimated quantity of cane to be crushed at the Mosman Central Mill is 60,000 tons. They hope to turn out 7,000 tons of sugar next season.

THE INDIAN SUGAR INDUSTRY.

Lord G. Hamilton, in reply to Mr. Maclean, in the House of Commons, said:—"For the eleven months ending February, the imports of Mauritius sugar into India were below those of the preceding year, but above those of 1897. The importation from China and Java into India, in the aggregate for the same periods, showed a considerable increase over both preceding years. I am unable to say what the acreage of sugar cultivation for 1899 in India was, as the drought has greatly disturbed the normal conditions of agriculture. The object of the Countervailing Duties Act was to establish equality of conditions between the Indian cultivator of sugar and the bounty-fed foreign importer, so far as competition in India was concerned. This has been secured, and I have no intention of reverting to the old and inequitable state of things."—*London Standard.*

Forestry.

BRIEF NOTES ON SOME TIMBER TREES OF THE BURNETT DISTRICT OF QUEENSLAND.

No. 4.

By J. W. FAWCETT,
Member of the English Arboricultural Society.

89. *Eugenia Smithii*, Poir.—Lilly-pilly; Native Rose-apple.

A small, slender scrub tree, with somewhat fibrous bark, narrow oval leaves, small paniculate flowers (January to March), and a white or purplish globular, edible, acidulous fruit (ripe May to September); yields a hard, tough, close-grained, dark-coloured timber, apt to split in seasoning, and useful for tool-handles and staves.

90. *Eugenia Ventenatii*, Benth.—Water Gum.

A large and tall spreading-headed scrub tree with often drooping branches, lively green oblong leaves, paniculate flowers (October to December), and greenish-white globular berries; yields a tough, close-grained, pinkish-grey timber useful for cabinet-work, boat-building, and tool-handles.

91. *Eugenia myrtifolia*, Sims.—Scrub Cherry.

A medium-sized scrub tree, with somewhat fibrous bark, oval oblong leaves, large pedunculate flowers (November to May), and oblong, purple or reddish, edible cherry-like fruit (ripe January to June); yields a tough, close-grained, light-grey timber, useful for tool-handles. The fruit useful for jam-making.

ARALIACEÆ.

92. *Panax elegans*, F. v. M.—Whitewood; White Sycamore.

A handsome and singular, moderate-sized, palm-like scrub tree, with large, simple, or doubly pinnate leaves, generally at the ends of the branches; large, dark-coloured, paniculate flowers, and flattened fruits; yields a light, soft, elastic, whitish timber, not used.

CORNACEÆ.

93. *Marlea-vitiensis*, Benth., var. *tormentosa*.—Musk Tree; Musk Wood.

A small-sized scrub tree, with a thick stem, rough, scaly, dark-coloured bark, ovate-oblong velvety leaves; having flowers in short axillary cymes (July to September), and the fruit an ovoid drupe (ripe August to December); yields a beautiful close-grained, bright-yellow timber, black in the centre, with a fine undulating appearance and a musk-like smell, useful for cabinet-work.

RUBIACEÆ.

94. *Plectronia odorata*, F. v. M.—Scented Cockspur.

A small scrub tree, with ovate, glossy leaves, sweetly scented, whitish flowers (October to December), and a globular drupe; yields a very tough, hard, close-grained, nicely marked, yellow timber, which takes a good polish, and is useful for cabinet-work.

95. *Ixora Becklerii*, Benth.—

A small scrub tree, with smooth glossy leaves, white, fragrant, corymbose flowers (May to July), and small drupes; yields a tough, close-grained, dark-coloured timber.

96. *Pavetta indica*, Linn.—

A small scrub tree, with opposite lanceolate leaves, beautiful white, terminal corymbose flowers (September to December), and fruit a small pea-like berry; yields a very hard, firm, close-grained, light-coloured timber.

COMPOSITAE.

97. *Cassinia laevis*, R. Br.—Wild Rosemary.

A tall, slender forest shrub, with narrow linear leaves, white on the under sides, and white paniculate flowers; yields a close-grained, beautifully marked, dark-coloured timber, useful for veneers for cabinet-work.

MYRSINEÆ.

98. *Myrsine variabilis*, R. Br.—Smooth Holly.

A handsome, small forest tree, with variable foliage; small inconspicuous flowers in clusters, and a small indehiscent berry; found on higher grounds; yields a firm, close-grained, prettily marked, light-coloured timber.

99. *Ægiceras majus*, Gaert.—River Mangrove; Spurious Mangrove.

A small tree, with thick obovate leaves, sweetly scented white flowers, (August. September), and little white curved horn-like fruits, found on the borders of salt marshes and rivers; yields a close-grained, light-coloured timber.

SAPOTACEÆ.

100. *Sideroxylon myrsmoides*, A. Cunn.—Black Apple; Nut Apple; Scrub Crab.

A small, densely leaved scrub tree, with glossy elliptical leaves; scanty flowers (December to February), and small, black nut-like fruits (ripe in March); yields a hard, elastic, firm, close-grained, easily worked, light-yellow timber which does not shrink or warp in drying, useful for cabinet-work and shafts and poles of vehicles.

EBENACEÆ.

101. *Maba geminata*, R. Br.—

A small, slender scrub tree, with ovate, leathery, shining leaves, clustering flowers, and ovoid berries; yields a hard, heavy, elastic, tough, close-grained timber with black heartwood and light-coloured sapwood, capable of taking a good polish.

102. *Maba humilis*, R. Br.—

A small scrub tree, with very dense branchlets, obovate leaves, and ovoid edible fruits; yields a very tough, hard timber with black heartwood and light-coloured sapwood, useful for cabinet-work.

OLEACEÆ.

103. *Notelæa longifolia*, Vent.—Axebreaker; Native Olive.

A medium-sized, slender scrub tree with rough bark, lanceolate leaves, small flowers (January and February), and black or dark blue, bitter, globular drupes; yields a hard, tough, close-grained, and often finely marked light-coloured-timber.

104. *Notelæa microcarpa*, R. Br.—Native Olive.

A small scrub tree with often crooked stems, slender branches, narrow leaves, very small flowers, and small globular fruits; yields a very hard, close-grained timber with dark heartwood and light-coloured sapwood.

105. *Olea paniculata*, R. Br.—Australian or Native Olive; Ironwood; Marblewood.

A moderate-sized scrub tree with speckled bark, pale-green ovate lanceolate leaves, small white flowers (September to November), and a roundish, olive-like fruit; yields a hard, durable, close-grained. prettily marked whitish timber, which darkens towards the centre, and, when newly cut, with a rose-like smell.

APOCYNACEÆ.

106. *Carissa ovata*, R. Br.—Black Lime; Native Scrub Lime.

A small, erect, much-branched, spiny scrub tree, with ovate leaves, fragrant white flowers (January to March), and black, oval, edible fruits (ripe March to May); yields a finely veined, close-grained, light-coloured timber.

107. *Alyxia ruscifolia*, R. Br.—Chain-fruit; Swizzle-stick.

A small, erect, close-growing scrub tree, with ovate-elliptical leaves in whorls of three or four, fragrant flowers in small heads or clusters, and orange-coloured drupes or berries constricted into one or two small chain-like articles; yields a close-grained whitish timber.

108. *Alstonia constricta*, F. v. M.—Bitter-bark; Fever-bark; Cinchona Tree; Quinine Tree.

A tall shrub or small slender scrub tree, with a rough, thick, dark or yellowish, deeply fissured bark, glossy oblong leaves, small white flowers in corymbose cymes (November and December), and fruit of two narrow horn-like pods (a double follicle); yields a close-grained, pale-yellow timber, which warps in drying. The bark, which has an intensely bitter taste, possesses the same properties as quinine, and a decoction of it is sometimes sold as "bitters." It is much used by bushmen in cases of fever and ague, and as a potent in general debility.

109. *Tabernæmontana orientalis*, R.Br., var. *angastifolia*, Benth—Bitter-bark.

A dichotomously branched small scrub tree, with oblong lanceolate leaves; very fragrant white flowers (September to December), and yellow sickle-shaped follicles; yields a close-grained yellow timber.

BORAGINEÆ.

110. *Ehretia acuminata*, R. Br.—Brown Cedar.

A small, deciduous scrub tree, with oval, oblong toothed leaves; small white paniculate flowers (November to December), and small globular drupes; yields a firm, coarse-grained, easily worked, light brown or yellowish timber.

SOLANACEÆ.

111. *Solanum verbascifolium*, Linn.—Mullein-leaved Nightshade.

A small scrub tree, densely clothed with a woolly substance, ovate leaves, white flowers, and globular yellowish green berries; yields a light, close-grained yellowish timber.

VERBENACEÆ.

112. *Gmelina Leichhardtii*, F. v. M.—Queensland Beech; Native Beech; White Beech; Colonial Beech.

A tall and noble scrub tree, with grey bark, rough oval leaves; white flowers stained with purple, and blue succulent globose drupes; yields a very valuable strong, hard, durable, close-grained, greyish white timber, with a fine silvery grain; easily worked, neither contracting in dry weather nor expanding in wet weather, useful for decks of vessels, veranda flooring boards, for wood engraving and ornamental carving. It is not readily attacked by white ants.

113. *Vitex lignum-vitæ*, A. Cunn—Lignum Vitæ; White Beech.

A large, tall, handsome scrub tree, with thin greyish bark, oval leaves; dingy flowers, and rosy red, globular, succulent, cherry-like drupes; yields a very hard, tough, close-grained, dark greyish timber, useful for cabinet-work and decks of vessels and veranda floors.

114. *Clerodendron tomentosum*, R. Br.—

A small scrub tree, with oval velvety leaves, white corymbose flowers, and black or purple shining drupes; yields a light, easily worked, close-grained yellow timber.

115. *Avicennia officinalis*, Linn.—White Mangrove; Small Mangrove.

A small, erect branchy tree, with whitish bark, greyish-green foliage, thick ovate laurel-like leaves, small flowers, and globular bean-like drupe; found in thickets at the edge of tidal rivers; yields a hard, strong, durable, tough timber, valuable for stonemasons' mallets and knees of boats.

MONIMIACEÆ.

116. *Kibra macrophylla*, Benth.—

A small scrub tree, with very rigid, glossy, oblong-lanceolate leaves; small flowers, and smooth, black, glossy ovoid drupes; yields a close-grained, nicely marked light-coloured timber.

LAURINEÆ.

117. *Cryptocarya triplinerois*, R. Br.—

Usually a tall, handsome scrub tree, but only small in this district, with dark-green foliage, oblong lanceolate leaves, hairy on the underside, numerous flowers (November to December), and oval drupes; yields a soft, light, tough, close-grained grey timber, useful for decks of small vessels.

PROTEACEÆ.

118. *Xylomelum pyriforme*, Knight.—Native or Wooden Pear.

A small-sized forest tree, with furrowed corky bark, narrow oval leaves, creamy-white flowers in woolly spikes (December to January), and woody pear-shaped follicles, occurs on sandy ridges, common in the "Wallum" country, yields a coarse-grained, prettily marked, dark-red timber, suitable for cabinet-work, gunstocks, and rough furniture. The leaves yield a yellow dye.

119. *Banksia integrifolia*, Linn.—Entire-leaved Honeysuckle; Beefwood; "Bootharoom."

A large shrub or small forest tree, with rough corky bark, leaves of various shapes and sizes, generally entire, greenish-white flowers, often with a yellowish tinge (May to September), and cylindrical oblong fruit cones; found on sandy ridges near the coast, common in the "Wallum" country; yields a strong, close-grained, nicely marked, pinkish timber; useful for cabinet-work, ribs and knees in boatbuilding, and shoemakers' lasts. It is, however, perishable in outside work.

SANTALACEÆ.

120. *Exocarpus latifolia*, R. Br.—Broad-leaved Cherry Tree; Scrub Sandalwood.

A small scrub tree, with brown fibrous bark, stiff, leathery, oval-oblong leaves, minute flowers, and ovoid cherry-like fruit; yields a very hard, coarse-grained, handsomely marked, fragrant, dark-coloured timber, useful for cabinet-work.

121. *Exocarpus cupressiformis*, Labill.—Cypress or Native Cherry Tree.

A small, graceful cypress-like forest tree, with drooping branches, minute flowers (May to July), and globular drupes, with red succulent edible fruit-stalks, yields a soft, light, close-grained, pinkish-grey timber; useful for turnery.

EUPHORBIACEÆ.

122. *Cleistanthus Cunninghamii*, Muell. Arg.—

A small scrub tree, with oval-oblong leaves, minute flowers (December to February), and globular fruit capsules; yields a hard, close-grained, light-coloured timber.

NOVEL EXHIBIT AT AN AGRICULTURAL SHOW.

For many years forestry and woodcraft have held no place amongst the attractions at agricultural shows. Of late, however, prizes have been offered at some shows for the most expert handling of the axe, both in felling a tree and logging it afterwards. These prizes have attracted many of our best axemen, and the greatest interest has been exhibited by the general public in such contests, especially as those entering for them are men who thoroughly understand the use of the American axe, and could hold their own against any American lumberer. The credit of another innovation in exhibits is due to the committee of the late Biggenden Agricultural Show, who offered substantial prizes for the best wagon-load of log timber, to be judged on the following points:—1. Quality of log. 2. Quantity of feet in load. 3. Compactness and security of loading. Four competitors presented themselves. A reference to the illustration herewith will show the wagon to which the first prize was awarded (that on the left in the foreground). This wagon carried three logs containing 4,000 feet of timber. The loading was considered perfect, the ends of the logs being exactly level, and on looking through the triangle formed by the three logs it could be seen that they touched each other in their entire length. The second honours were awarded to the wagon on the right. This load contained 4,200 feet of timber; but it lost points on the style of loading, whilst the off-side log was distinctly crooked. These four wagons carried no less than 15,400 feet of pine timber, and had been drawn for a distance of 12 miles. The exhibit was a centre of interest to timber-getters, and was much admired by visitors to the show.

The item of bushwork having now been shown to be so thoroughly appreciated, why should other bush industries not be brought before the public? Splitting, in all its branches, would prove of absorbing interest to people who have never seen a shingle except on a roof, nor a post or rail except in a fence, nor a stave except in a cask. If prizes were offered for such exhibitions of bushcraft, the contests would be far more instructive than a senseless buck-jumping competition. Nobody wants bucking horses. If prizes were offered for the best trained and most docile horses, nothing could be said against such exhibits, but a buckjumper should be excluded from every well-regulated show ground. To give prizes for such is to offer a premium to men to teach horses to buck, and so to produce an animal worthless for any purpose under the sun.

EXHAUSTION OF TIMBER IN SWEDEN.

The Swedish match industry has increased to a large extent in Sweden in spite of the great competition of other European countries and of Japan. Vast quantities of the matches known as wooden safety matches are made in Sweden, and whole forests have been cut down to furnish the needful supply of timber. With singular want of foresight, no trouble has been taken to so regulate the felling of timber that a continuous supply would be forthcoming. The inevitable consequence has ensued. The forests of Sweden are exhausted, and the match-makers have to import the class of timber used in the trade from Russia. Nine hundred and seventy-five thousand cubic feet came in one year from Russian ports. But Russia herself has entered on the safety-match trade, and now an export duty has been put on the timber. This will, doubtless, seriously affect the Swedish manufacturers.

In Queensland hundreds of pine trees are being felled weekly. The main trunks up to the first knots alone are sent to the mill. Hence, there are millions of feet of timber lying rotting in our scrubs, which might profitably be cut into short lengths free of knots, and exported to Sweden.

Doubtless there are not many who would care to risk the experiment, bu have we no enterprising speculators of means, who would take the preliminary steps to ascertain if it would pay to enter on the business, and send a trial shipment?

CANE, RAIN, FROST, AND TIMBER.

To the observant it is a notorious fact that the meteorological and climatic conditions of what may be termed the tropical parts of the colony are undergoing a change of such serious importance to agricultural interests generally, and every year intensifying, as to give rise to grave reflections as to the why and wherefore, and, it may be, to possibly effect a mitigation of the cause. Well authenticated facts go to show that districts or localities hitherto favoured by ample or normal rainfall, are being striken by abnormal drought and ravaged by frost never before known. Whatever else there may be, one very potent factor for this destructive change is unquestionably and in a great measure due to the wholesale denudation of standing scrub and forest throughout the country. It requires no argument to prove that this reckless depletion of timber is very largely responsible for the experience now so common, and, if ruthlessly persisted in, can only, in good time, culminate in the downfall and probable extinction of what are recognised as cultivable areas, so far, at least, as tropical culture is concerned. Most agriculturists know that a belt of scrub affords, if not entire immunity from frost, at least such protection—particularly from a westerly aspect—as to greatly minimise its destructive effects. Yet cane being keenly sensitive to frost, we find no greater recklessness displayed in felling timber than has been and is now taking place in large cane-growing centres. Since temperature and rainfall are invaluable natural elements upon which cane-growers largely depend, surely such culpable negligence is inexplicable, as by this action follows the certain decreased rainfall, together with the certain increased severity of frost—two conditions that are inimical to agricultural pursuits generally, aggravated by the knowledge that it is largely preventible. Every man has possibly the right to do with his own land as he deems best, but certainly not the right to endanger the toil and industry of his neighbour, although even done in ignorance. Indeed, the matter is of such urgent importance that some legislation should be enacted as to place the subject under legal control. We all know, or at least partially realise, the value of irrigation, yet we wilfully undo what Nature has intended we should enjoy and derive benefit from, by carelessly overlooking the laws of Providence, or even what may be considered the very ordinary qualities of simple common sense. If economy plays any part in agriculture, we should carefully conserve what Nature has wisely provided, and in turn respond with generous cultivation, and when we have done this then we may reasonably resort to artificial means, by the aid of skilled irrigation and the application of commercial fertilzers, commensurate with the crops obtained conditions that demand intelligent culture and artificial aid where the land, as it should be, is kept up to its former virginal productiveness. In any case the subject is one that should have the attention of the newly created Forestry Department as well as of that of Agriculture.—*Exchange.*

FRENCH SCENT FARMS.

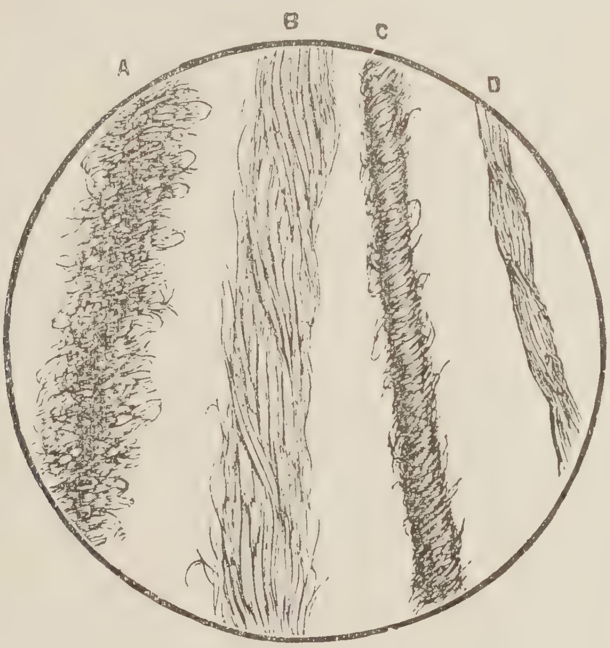
The flowers mostly cultivated on the French scent farms are the violet, the jonquil, and mignonette, which are picked in February, March, and April, though when the winter is mild and rainy, violets begin to flower in December. Roses, orange blossom, thyme, and rosemary are gathered in May and June, tuberose and jasmine in July and August, lavender in September, and acacia in October and November. But the most important crops of flowers are the roses and orange blossoms, the others being mostly grown by small cultivators in the rural districts among their vines and olives. One of the largest flower farms is one at Seillans, about 2,000 feet above the level of the sea, and 20 miles from the coast, upon the southern slope of the Alpes-Maritimes.—*Australian Field.*

Science.

WOOLLEN MANUFACTURE—*Continued.*

By J. S. HERMANN SCHMIDT.

On a former occasion I have tried to explain the difference in the construction of woollen and of worsted yarns. The former being composed of fibres that have retained their natural crimp, and are arranged in a most disorderly position. For the latter (the worsted), the crimp has to be removed, and those wool fibres that have still retained their crimp and are broken have to be separated from the straight and sound ones. Microscopically these yarns also

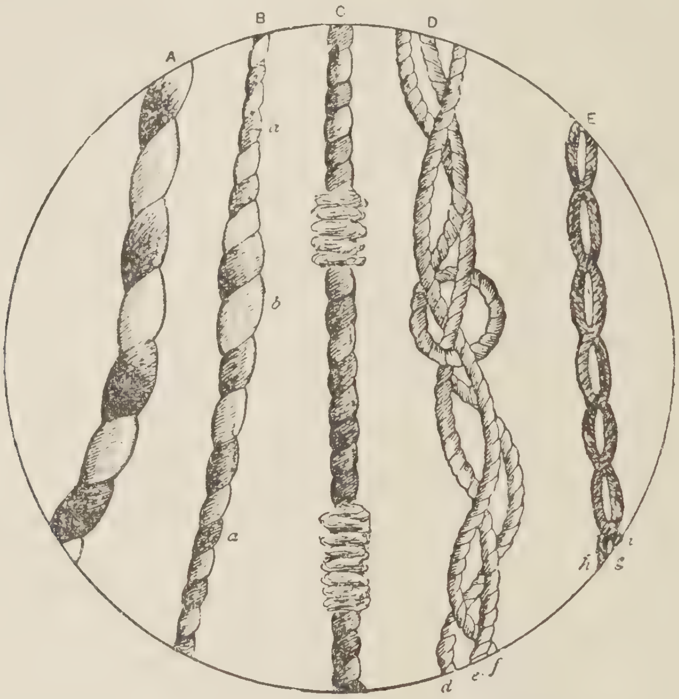


A=30 skeins woollen yarn.
B=2-fold 30 skeins worsted.
C=40 skeins cotton.
D=2-fold 60 skeins silk.

differ very materially from each other in structure. When thus examined, the woollen thread resembles one continuous mesh of entangled fibres, tightly clustered together, especially in the heart of the thread, where they form one solid mass, which gradually decreases in density towards the edges. The worsted yarn appears comparatively more regular in construction, the multiplicity of the fibres not being so large nor yet so compactly twined round each other; the object of the process of manufacture in this instance being to use the strongest, straightest, and longest of the fibres, and also to arrange them, as far as possible. in parallel lines. As to cotton, it resembles in general appearance, when examined under the miscroscope, a solid cane; it possesses, however, a slightly undulated surface, while a few straggling filaments are distinguishable here and there on its circumference. In the silk yarn the individual fibres are so firmly grouped together that it scarcely seems to have been produced from a material of a fibrous character.

At the same time, various kinds of yarn are manufactured which are modifications of either the one or the other kind. In some of these the wool fibres are more loosely arranged (finger wools, Berlin wools); in others several yarns

of different qualities and colours are twisted into one. They are designated as: Cloud, knopped, curled, and diamond twists, into a description of which we cannot enter.



For the purpose of a practical woolgrower it is necessary to understand and to appreciate the superior value of goods fit to be combed and to be used as chain or warp yarns over those that can only be worked into worsted yarns, or to be used for wefts or woofs, as I shall explain directly.

Weaving.—In the words of Professor Beaumont: "Every variety of woollen fabric, whether plain or figured, results from crossing, or rather from interlacing, two distinct series of threads together. Thus, when a woven cloth is submitted to analysis it is found to be composed of two classes of yarn; first, those that extend longitudinally in the piece and are termed collectively warp, chain, or web; and secondly, those which extend transversely in the piece and are designated weft, woof, alb, or filling.

Warp and weft may be considered as the two essential factors of every type of loom production. There is, however, a class of goods made on the stockinette frame which, although containing one body of threads only, is often regarded as a woven texture; but, strictly speaking, such a cloth is not woven, but knitted; it is easily unravelled, which is not the case with woollen fabrics.

The threads that are running in a longitudinal direction, forming the warp or chain, are divided into separate sets, each of which is raised or lowered by an apparatus called the heald or heddle. The space which is thus formed by the threads raised, and those left in their original position, is now filled by a thread, or by several sets of threads in a regular succession, called picks, shoots, &c., running in shuttles across the two sets of separated chain yarns.

It is easily understood that a great variety of patterns may be formed by first arranging sets of chain thread, varying in colour and construction, longitudinally and crossing them in a regular succession by different kinds of pick or shoot threads, by, secondly, raising and lowering the chain threads in a certain order, which has been previously devised for the purpose of producing a certain pattern. A damask table-cloth is a good example of artistic weaving. Thus, by the use of perfectly smooth and even threads of the worsted kind, and by artistically arranging and weaving them, we can produce an endless variety of woollen materials. That class of goods, however, technically called cloth, properly speaking, and which is made of woollen yarns, is formed by the ordinary plain or tabby weaving, and it shows the same pattern as ordinary canvas or calico. Cloth does not show any pattern but the plain threads. It has an unsightly appearance at first, showing the threads, which have, moreover,

a rough surface. It therefore becomes necessary to hide them and to produce an artificial surface that shall be smooth and even. This is accomplished by imparting to the surface an artificial roughness by firstly scratching the cloth so as to cause the ends of torn wool fibres to form a cover over the threads, or what is called a nap; this, being eventually brushed and pressed down, serves to hide the threads and to produce an even surface. Before attempting to raise the nap it is necessary to render the cloth more firm and solid, otherwise the attempt of raising the nap would injure the cloth. This is accomplished by the process of felling or milling.

The most primitive method of working wool fibres into a solid felt consisted in beating or hammering it by stamping the cloth, or in walking on it with the bare feet, after the cloth had been soaked in water and lubricated with soap. By this means the natural elasticity of the wool was temporarily got rid of, and the fibres were thoroughly entangled with each other—as I have explained when speaking of the felting property as a desirable quality of the wool. This process is now carried on in the case of woven materials by a machine constructed similar to that of an ordinary clothes mangle. The machine consists of a set of rollers, between which the cloth is passed and pressed tightly; one end of the piece is passed through the rollers and sewn together with the other end, after which the machine is started. After an application of hot water and soap, the piece is now worked through the rollers for many hours, and when it is taken out again it has shrunk in length and breadth but has gained in thickness. It has, moreover, become as tough as leather, because the threads have become more or less entangled with each other. Thoroughly felter cloth will now withstand the action of "roughing" and "raising the nap."

This is accomplished by the use of thistles (*dipsacus fullonum*) which are fastened on iron rods, and these are so arranged as to form a roller. The spikes of this thistle are just strong enough to scratch up wool fibres, and yet sufficiently supple not to injure the cloth. The ends of the wool fibres protruding from the surface of the cloth are now brushed down and clipped off, at an equal length, by a machine constructed for that purpose.

It would lead us too far away from the purpose for which these lines are written if I were to give a minute description of the various operations adopted for imparting to the final finish, and to the methods of dyeing, &c.

It is maintained by many wool experts that the shorter kinds of wool will ere long be a thing of the past, that they are practically out of date now, and that their place will be taken by a stronger description of wool, having a longer staple. That, of course, is a matter of opinion. For the manufacture of the various kinds of real cloth, such as plain broads, moscows, beavers, pilots, doeskin, &c.; one shorter and finer description of wool will be preferred, and very large quantities of good cloth will always be required, particularly by the armies of Europe, so that the demand for short wools is not likely to terminate for many years to come. In many localities of Australia the shorter descriptions of wool grow to perfection, and, if carefully bred, obtain a high degree of the felting property, which renders them particularly suitable for cloth making. So long as short wools are grown densely all over the body, comparatively shortstapled fleeces may be grown to yield 8 lb. and more, as an average from thousands of sheep.

Whether it is the intention of the breeder to grow long or shortstapled wool, he should bear in mind that desirable qualities for a good combing are the same as those for a good clothing—viz., elasticity, softness, lustre, regularity of growth, &c.

Density is under all circumstances to be considered as the prime factor towards obtaining weighty fleeces. So long as that point has been obtained, it does not matter very much whether a staple is ½ inch to an inch longer or shorter. Any thoroughly wellbred, densely grown, shafty wool may be used for the purpose of producing the best woollen or worsted threads. In producing densely grown fleeces of medium length, more satisfactory results are generally obtained than from long and open staples ones.

Entomology.

THE SWEET POTATO WEEVIL.

(*Cylas turcipennis*, Bohm. ; *C. formicarius*, auct. *nec* Fabr.)

By HENRY TRYON,
Entomologist.

Plates XV. and XVI.

The sweet potato weevil is a steel-blue and red insect measuring about $\frac{1}{4}$-inch in length, and one that—in the grub state especially—mines in the tuber and other parts of the plant, whence it derives its name, and so in due course partially or wholly destroys it.

EXTRA-AUSTRALIAN OCCURRENCE.

Although named and described upwards of a hundred years since [(1) p. 549)],* it is but comparatively recently that it has been credited with the possession of the habit of injuring any cultivated plant. For many years, in fact, it was regarded as one of the rarities of entomological cabinets; thus, Miske, writing of it as recently as 1880, entitled it "A rare Beetle injurious to Sweet Potatoes" [*cf.* (14)].

At what remote period the sweet potato weevil first manifested its destructive habits is, perhaps, not now ascertainable. It was not until 1857, as far as is known to the writer, that this feature in its economy was alluded to in scientific literature. It was then that J. Nietner, writing from Colombo, recorded the fact that in 1856 he had met with an instance of its damaging sweet potatoes in the north-west coast of Ceylon in which $\frac{19}{20}$ of the crop was destroyed. He also stated, at the time, that it occurred throughout hundreds of acres [(9), p. 36]. Facts have recently been brought to light that point to the conclusion that its ravages have long been experienced by planters in some of the West Indian Islands—*e.g.*, Cuba and St. Elizabeth amongst others [C. H. T. Townsend (21)]. Already, in 1878, it had become so prevalent as a pest in some parts of Florida "as to threaten the destruction of the sweet potato crop of that country" [Comstock (13), p. 249]. Leconte, about the same time, or even earlier [(12)], had reported its occurrence in another of the States of the American Union—viz., Louisiana. In 1887, having found its way to Texas, it commenced there its pernicious work, destroying locally the crop for three years in succession [C. V. Riley and L. O. Howard (19), p. 334.] Already, in 1894, it was pushing its way across that State [F. M. Webster (25), p. 123]. On the authority of Leconte, the insect also occurs in the Antilles, Cochin China, India, and Madagascar. It is not, however, clear that he referred to its exhibiting destructive habits in all of these countries.

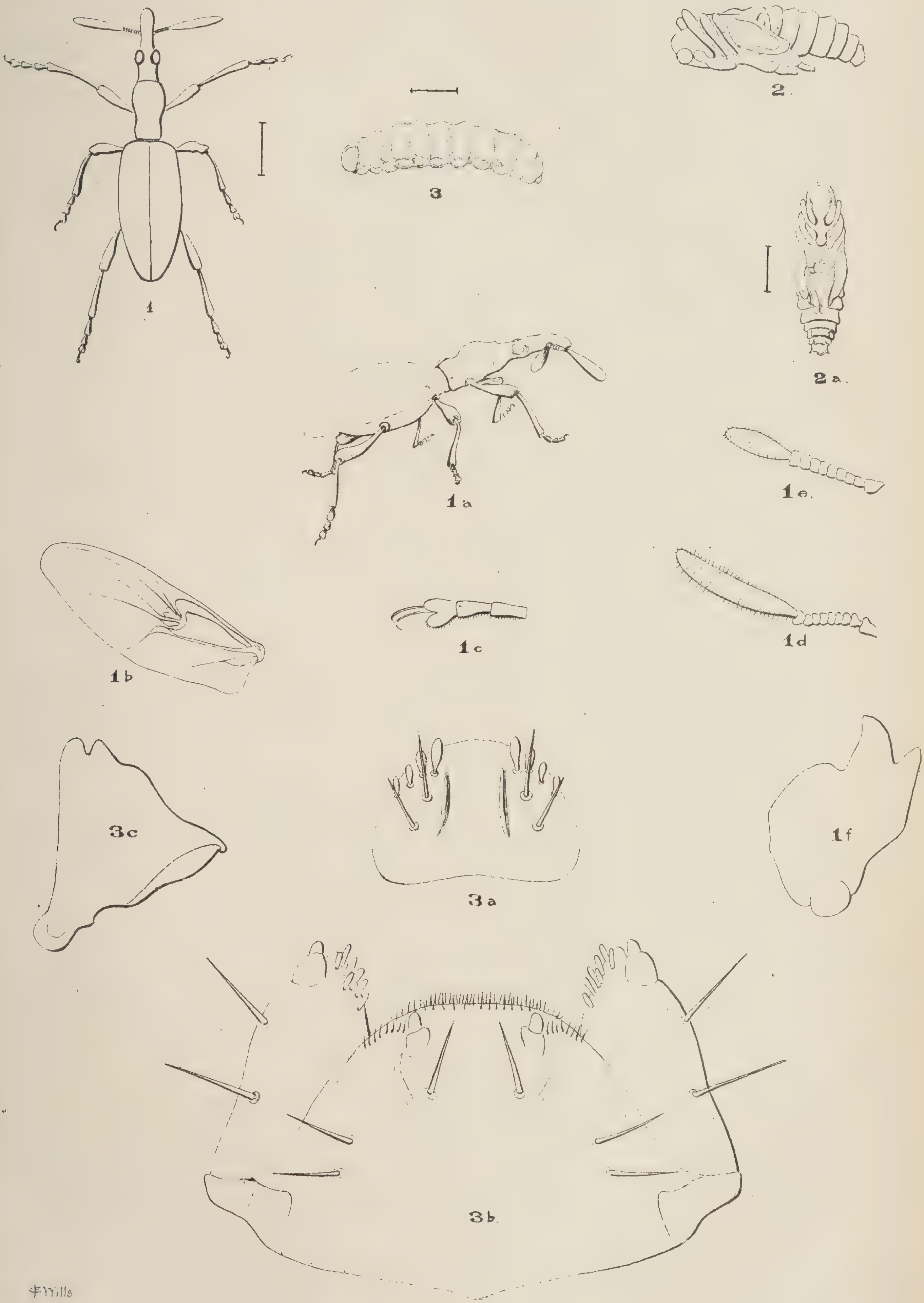
There is no definite record, as far as the writer is aware, of the presence of the insect in what are generally spoken of as the South Sea Islands. Moreover, there being some grounds for concluding that it existed in one of them—viz., Norfolk Island—W. W. Froggatt, Entomologist to the Department of Agriculture of New South Wales, whose knowledge of the destructive insects of plants is very extensive, states also that he has no information as to its occurrence in the special island mentioned, nor, indeed, in any other of them. However,

* The full titles of the works referred to now and subsequently are set forth in the section of the paper entitled "Bibliography," the special memoir alluded to in each instance being indicated by use of the distinctive number under which each is mentioned.

Plate XV.

TUBERS AFFECTED BY THE SWEET POTATO WEEVIL.

Plate XVI.



SWEET POTATO WEEVIL (*Cylas formicarius*).

a Mackay correspondent—A. McMasterton—writing in 1893, states:—"I am informed by a South Sea Islander I have in my employ (a Solomon Islander) that he has seen these insects in the Solomon Group, and that they destroy potatoes there." All the "sweet potatoes," including examples of several named varieties, seen and procured by the writer during a visit to British New Guinea in different localities between Port Moresby and Samarai and for some distance along the north coast of the Protectorate from the latter point, were found to have been uninjured by the insect under notice, or indeed by any other one of similar habits. With regard, however, to New Guinea and the South Sea Islands, such negative evidence is not to be considered conclusive of the non-occurrence of the sweet potato weevil in it and these numerous and widely scattered localities.

AUSTRALIAN OCCURRENCE.

Its first occurrence in Australia was remarked in June, 1886; but whence and under what circumstances it arrived have not been discovered. Mr. A. Miles, of Hemmant, a district situated at a short distance to the south of Brisbane, having at that time experienced a partial failure in his sweet potato crop in consequence of its ravages, mentioned the circumstance at a meeting of the East Moreton Farmers' Association. This incident occasioned the preparation of a special official report [Tryon (16)] on the part of the writer that was widely published in Queensland. In this report "the destruction of all affected tubers and a change of crop" were mentioned as the only remedies that could be suggested.

Although this incident occurred in 1886, the fact of the insect having already manifested its presence in so marked a manner affords grounds for concluding that its introduction to the colony preceded this event by at least several months.

The extreme measures advocated, although shown to be based on an understanding of the life-habits of the pest to be contended with, were not, however, resorted to at the time. Accordingly, in 1888, the weevil had found its way to Woolloongabba, a part of Brisbane itself, as reported to the writer by R. Morris.

In the following year the writer again called special attention to the insect and its ravages, on the ground that, "like the 'grub' of the common potato, it would no doubt shortly occur further a-field." On this occasion, moreover, he described minutely both the insect and the nature and extent of its ravages. By way of coping with it, it was also recommended that "the potatoes be unearthed as soon as demand for them has arisen, and consumed with as little delay as possible; all affected ones being destroyed or used as food for stock. Also, if practicable, in a district where the disease has manifested itself, all the sweet potatoes which have been raised there be consumed on the spot, and that during the succeeding season no sweet potatoes be grown" [Tryon (17) 187-8 and (18), pp. 88-89].

Only in exceptional instances was this advice followed. Hence it happened that the sweet potato weevil soon asserted its presence by producing much destruction of crop in the entire neighbourhood of Brisbane to the extent of a radius of several miles (Mount Cotton, Wellington Point, Deception Bay, Humpy Bong, Sandgate, Zillmere, Eagle Farm, Moggill, Corinda, &c.). Already towards the close of 1889 the insects were met with at Cairns [C. W. Wild], and soon in limited areas wrought destruction to the sweet potato cultivations there* [E. Cowley].

It was not long again before it was noticed at the Herbert River, at Mackay, in two agricultural centres within the vicinity of Bundaberg, and it is now most

* There are some grounds for concluding that its extermination has already been in great measure effected in this important northern coastal district.

destructive in all these sugar-growing districts. More recently* again it has found its way to the Johnstone River. Thus an observant visitor to that part of the colony writes in February, 1900:—"I found that the metallic weevil was very bad amongst their sweet potatoes, simply destroying the crop, especially the Maltese variety" [J. A. Hamilton].

Its occurrence in these important agricultural districts of the colony may be largely the outcome of the trade in sweet potatoes between the farmers of Southern Queensland on the one hand and the sugar planters on the other, to meet the food requirements of plantation labourers. Sweet potatoes received at a Bundaberg plantation from Brisbane, during the preparation of this paper, were found—as a correspondent has testified—to be much infested by the pest. Their arrival in Melbourne in a similar condition, from Queensland, has also been reported [C. French, 27].

EXTENT OF INJURY.

The following statements of what may happen when the sweet potato weevil is prevalent in a district are characteristic of the complaints generally of those who have experienced its destructive work:—

(1.) "The tubers forwarded to you were from vines planted just prior to Christmas, so that the crop is scarcely matured yet (19th June). The damage done is of such a nature that the crop is a total failure when attacked" [W. J. Tutin].

(2.) "They are now very numerous on my own land, whereas last year was the first appearance of them. . . . They attack the young plants at all stages of growth, and they are equally destructive and numerous in virgin land, as in that that has been cropped once or twice. I have land that yielded previous to the advent of the pest at the rate of fifteen to twenty tons to the acre. Now it will not yield four. . . . Horses, fowls, and pigs will not eat one if it has been punctured by one of these grubs" [A. McMasterton].

(3.) "I find difficulty [on account of the ravages of the insect] in getting enough sweet potatoes for my dinner during the last two or three years."

Instances again have come under the personal notice of the writer of entire plots of sweet potatoes being rendered wholly unproductive in consequence of the devastations of the insect.

Even when apparently sound sweet potatoes are selected from a damaged crop, there may still be considerable loss. Thus a Bundaberg correspondent, who had recently received a large consignment from Brisbane, wrote:—"Out of every four bags washed and cut up there is one bag unfit for food" [W. Gibson].

To further quote the opinion of the last-mentioned witness, "the matter is very serious." As elsewhere stated: "Owing to the extended occurrence of the ravages of the insect-pest in question, the home demand for sweet potatoes not only cannot be met, but, moreover, the profitable export trade in this class of vegetables that exists can by no means be sustained. Apart from the food requirements with respect to sweet potatoes on the part of the European population, this esculent forms a considerable element in the dietary of the labourers on our various sugar plantations, and thus also the profitable conduct of the sugar-growing industry is in a measure dependent upon a supply of sweet potatoes being forthcoming."

Moreover, this constant source of income to the farming community generally will be ceased to be enjoyed when, owing to the condition of their sweet potato crops, they can no longer avail themselves of it.

* But a few months prior to this announcement the present writer, in the course of personal inquiry along both the north or south branches of the Johnstone River, failed to learn of the occurrence of injury by the sweet potato weevil. This fact, in conjunction with the more recent announcement, is evidence of the rapid development of the insect in destructive numbers when once imported to a district.

Again, the important part which this plant plays in the raising of pigs and other stock has to be considered. In fact, the loss that may annually be credited to the destruction wrought by the weevil must amount to many thousands of pounds sterling. There is also the loss experienced through having to raise, upon land especially adapted to the growth of the sweet potato plant, other crops that, on account of the special soil characteristics present, cannot be produced at nearly so great a profit.

NATURE OF INJURY—SYMPTOMS.

A sweet-potato cultivation in which the weevil is already very prevalent presents the following features :—The "vines" possess much less foliage than they otherwise should, and are thickened—especially just above the roots—shorter, and more irregular in their growth than they otherwise would be; in fact, they manifest, generally, a stunted or "poverty-stricken appearance." On dividing some of the thickened stems lengthwise, these parts of the plant will be found to be hollow and ultimately more or less rotten; or an excess of brown tissue will be noticeable, in which channels or crevices may be discernible. No tubers will be found to have attained full development, and the smaller ones that are present will be seen to be pierced with holes, traversed through and through with tunnellings, and more or less brown and rotten internally (*vid.* Plate XV., fig. 3, representing a section of a small tuber that has already been completely destroyed).

Should the insects occur in fewer numbers, the external indications of their presence will be less marked on a casual inspection of the field. Closer scrutiny, however, will show that the lower portions of the stems of the vines present a thickened, uneven, and generally irregular habit of growth and external marks of injury; also, that a proportion of the tubers have matured, whilst the others are considerably of undersize, and evince, to a greater or less extent, the features already described; the absence of development on their part being accounted for both by the direct injury from the insects that they have experienced, as well as by the fact that the parts of the plant above ground, whilst harbouring the destructive grub and being damaged by it, cannot properly perform their assimilating functions. This discrepancy in the comparative size of grub-injured and sound tubers in connection with weevil-infested plants, under the circumstances mentioned, has, however, given rise to the suggestion that only the young tubers are attacked. This is, of course, not in accordance with fact. In such of the larger tubers as exhibit injury, not only will this be displayed on their external surfaces—numerous dark-coloured pits and punctures being remarked, and possibly also meandering narrow dark-brown bands and patches (Plate XV., fig. 1)—but in the internal tissue opposite to these appearances will occur numerous conspicuous tunnellings, and the living insects concealed within them.

Should a still milder attack be experienced, nothing unusual may be remarked—especially on the part of those who have had no previous acquaintance with the insect's destructive work—until the tubers are dug. It will then be noticed that some will present more or less numerous punctures, especially towards their "stem-ends," and—on cutting them through in these parts—narrow brown tracks of dead tissue. Possibly, also, the presence of some whitish grubs, or metallic blue ant-like beetles, will be at the same time revealed; as will be especially the case should the tubers be worse affected than this. Sweet potatoes in the condition described are not infrequently placed on the market, and so distributed in the course of trade with very undesirable consequences. It is even known that in one instance such examples of weevil-infested tubers were purchased in Brisbane, and then used on a farm for furnishing "new seed."

Again, when but a few beetles have recently commenced operations in a cultivation, not even the harvested crop may evince any sign of their presence that will be recognised unless it be subjected to the closest investigation, and the observer have a knowledge of the obscurest symptoms denotive of the presence of the insect at his disposal. This knowledge cannot be communicated by verbal instruction alone.

When sweet potatoes have already attained their full development—but are but slightly injured, if at all—they may, if left in the ground, eventually manifest more or less complete destruction, the extent of the diseased condition arrived at being directly related to the duration of their continuance in this position. Moreover, injury in tubers may become more pronounced in the course of storage.

The passages that are tunnelled by the weevil larvæ in the plant-tissue, whether of vine or tuber, vary from 2 mm. ($\frac{1}{12}$ inch) to 4 mm. ($\frac{1}{6}$ inch) in diameter, and when first made may—especially when deeply situated—be but little conspicuous, insomuch as their walls and contents may then lack any special colouration by which they may be distinguished. With access of the air, and the chemical changes that are thereby induced (possibly aided also by the peculiar liquid that may be noticed at times to issue from the insect's mouth), the injured portions manifest a more or less intense brown colour; and these affected parts, when occurring near together, often coalesce to form large areas of strongly discoloured tissue. At the same time the tissue that is subject to this change develops a peculiar somewhat pungent acridity—to such an extent indeed as to account for the fact that weevil-damaged sweet potatoes are generally discarded by all classes of domestic animals that are especially partial to sweet potatoes in a sound condition. Under the influence of the above injuries, the complete decay of the tuber may soon eventuate.*

DESCRIPTION OF INSECT.

The Beetle (Plate XVI., fig. 1—1*f*) is an oblong narrow weevil, measuring when extended about $\frac{1}{4}$-inch in length, with a rather prominent forwardly directed somewhat slender snout, and with the three divisions of the body—*i.e.*, the head, the thorax, and abdomen—well defined both as regard form and colour, the head being black, the thorax red, and the hind-body dark steel-blue. The last is also narrowed both before and behind, and is very deep and convex. Altogether the insect has a somewhat ant-like appearance with its elongated body and long legs; and it is by reason of this circumstance it may have been named *formicarius* (Lat. *formica*, ant.) The following technical description will serve to distinguish it:—

A smooth, glossy beetle; hind-body both above and below dark steel-blue; prothorax except anterior border, mesothorax, and limbs red, femoral enlargements and tarsi inclining to brown; head, foreborder of prothorax, and funicle of antennæ black. Prothorax and hind-body above and beneath with miscroscopic sub-remote punctures, each giving rise to a minute greyish hair. Head and rostrum more coarsely and closely punctured, especially the latter, which is also corrugated at the sides. Head narrowed behind the eyes, and with a few fine transverse lines in this region. Rostrum stout, very slightly arched elongated. Eyes large and prominent, separated by a width equal to $\frac{2}{3}$ diameter, occupied by a smooth depression. Antennæ (Fig. 1*d*) with the scape (1st joint) very short; the funicle 8-jointed with its last joint some what larger and longer than the others that are subequal; mass jointed cylindrical equal to the last six joints of the funicle in the female, further lengthened, and exceeding the remaining nine joints of the antennæ in the male, clothed with short grey hairs. Prothorax elongated, truncated at both ends, divided into two convex parts—the hinder of which is the shorter—by a deep encircling groove. Hind-body narrowed in front and behind, compressed from side to side, 1st and 2nd segments beneath soldered together. Elytra narrowed, deep and very convex, covering and closely embracing the abdomen; scutellum absent. Wings (Plate XVI., fig. 1*b*) rather more than twice the length of the wing-covers, folded in repose, delicately membranous, but strengthened by special thickening of the principal veins that are of a horn-brown colour. Legs rather long, especially hind pair that exceed the

* The ultimate result arrived at is well described by J. Nietner, the first, as has been stated, to give an account of the ravages of the sweet potato weevil:—"die im Innern sonst schneeweissen Knollen aber waren in eine mehr oder weniger braune, faulige, schwammartig durchlöcherte, zu allen Zwecken untaugliche Masse verwandelt." [(9), p. 36.]

abdomen; femora longly pedunculated and thickened distally; tarsi (Fig. 1*c*) elongated, 3rd joint deeply lobed.*

THE EGG.—The eggs are broadly oval and somewhat narrowed at the attached end. Their diameter is about ·65 mm. ($\frac{1}{46}$ inch); their surface is not polished, but shows slight granulation, and a faint appearance of divisions into facets. In colour they are yellowish-white [Comstock (13), p. 250].

THE LARVA (Plate XVI., fig. 3*c*), or grub, is cylindrical in shape, with each extremity rounded, is footless, and has a pale-brown head. It is almost white in colour, and measures, when full-grown, nearly $\frac{1}{4}$-inch in length. It may be more exactly characterised by the following description :—

Cylindrical, with the sides somewhat projecting at each segment. Head rounded and prominent, but distinctly narrower than the body proper. The three thoracic segments are successively longer one than the other. They are without appendages, the legs being each represented merely by two rounded tubercles, one being superposed on the other. The abdominal segments, nine in number, gradually increase in length from the first to the eighth. Each has a central, transverse, low, rounded dorsal ridge, the intervals between the ridges being slightly concave. The mouth organs are well developed, and directed downwards. Of these the labrum (Fig. 3*a*) is rounded in front, has two longitudinal mesial thickenings, four fusiform appendages in front on each side of the middle line and behind these two basally articulated long spines. The mandibles (Fig. 3*c*) are shortly triangular in shape, and have on the cutting edge an apical and a sub-apical stout, rounded tooth, and beyond the latter a convex projection. The maxillæ (Fig. 3*b*) are very stout, and extend beyond the labium to which they are soldered; the single lobe is broadly lanceolate, and extends on the inner side as a conical process on which are placed numerous short blunt bristles. The 2-jointed maxillary palp is very stout. On the outer side of the maxilla are two long bristles. The labium (Fig. 3*b*) is rounded in front, and has its foreborder even and clothed with short hairs; its constituent parts are intimately fused and incapable of being distinguished; its palps are 2-jointed and widely separated; there are six long bristles, one behind each palp and a pair within each lateral border. Length of larva when fully grown, 6 mm. ($\frac{1}{4}$ inch).

THE PUPA (Plate XVI., Figs. 1 and 2).—This, like the larva, is a white delicate object, but of somewhat smaller dimensions and about three times as long as broad. It displays—in a folded-up condition—the snout, feelers, legs, and wings of the perfect insect; the latter organs are, however, re-represented merely by oblong pads, one on either side of a segmented body. The following are its principal characteristics :—

Ventral aspect: The rostrum is bent directly backwards between the folded legs, the hindmost pair of which project behind the wing-cases. The eyes are apparent as two more or less dark spots; the antennæ are bent upwards on either side of the body reaching beyond its upper surface. The first four of the exposed abdominal segments have each a lateral conical projection (those of successive segments diminish in size), and the terminating one ends in two outwardly and posteriorly directed spine-like projections. Dorsal aspect: The rounded vertex of the head is succeeded by the thorax that appears as an anterior and two posterior rounded tubercles. This is bounded on each side by two elevations—the femoro-tibial joints of the two first leg-sheaths. Beyond the thorax are nine abdominal segments, and the first of these two are bounded laterally by the wing-sheaths.

HABITS OF INSECT.

The sweet potato weevil in its mature form may be met with at all times of the year, including even mid-winter—June. It is seldom seen outside the potato cultivation, though it may be found occasionally upon various plants

* The foregoing description is a slightly modified one written by the writer in 1889 [(18), p. 187]. The insect accords, moreover, in every particular with Bohemann's lengthy description of *Cylas turcipennis* published in Schoenherr's great work in 1833 [(6), p. 369]. It, again, agrees with the descriptions still earlier assigned by Fabricius [(1), (2), (3)], as well as that attributed by Olivier (4) to *Brentus* or *Attelabus formicarius*, except in the fact of being steel-blue instead of being black (*ater*). The definitions, however, given by the two last-mentioned authors are not sufficiently extended to adequately describe the species that was under their observation. Further, it corresponds with description given by Comstock (13) of the sweet potato destroying *Cylas* of America, and which, on the authority of Leconte, has been identified with Fabricius' species. Although the writer inclines to the opinion that the Ceylon, American, and Queensland insect is *Cylas turcipennis*, Bohm., and distinct from *C. formicarius*, Fabr., he has thought good in this article to regard them as synonymous.

growing in its vicinity, not, however, necessarily resorting to them for the purpose of feeding. It feeds upon members of the Convolvulus family, but especially upon the Sweet Potato (*Ipomœa Batatas*). It has been seen by the writer engaged in gnawing the leaves of the common purple flowered garden species (*Ipomœa purpurea*); the roots of this plant were, however, found at the time to be wholly uninjured. Of some five or six varieties of "sweet potato," which seemed to comprise more than one species of *Ipomœa* procured in British New Guinea, and grown in Queensland, not one escaped its attacks when grown in a beetle-infested field. It seems, however, to be specially partial to the white variety of sweet potato, commonly designated in Queensland the Maltese. This happens, however, to be the kind whose cultivation is most prevalent. The mature insect does not confine its attention to the tubers of ths plant that it affects. Thus it gnaws away portions of the stout succulent veins that occur so prominently upon the under surfaces of the leaves. Similarly it may attack the leaf-stalks or petioles. Again, it may excavate shallow pits in the stems of the plant, but these, growing as the stems increase, may assume an appearance not suggestive of their origin. It principally feeds, however, upon the tubers and parts of the plant above ground, immediately beyond the latter, not, however, tunnelling into their substance, but eating out holes here and there of different size of a round or oblong shape. In accomplishing this the snout of the beetle is not employed after the manner in which an auger is used, although, to save the movement of the body, it can be rotated about two-thirds of a circle. The actual cutting is accomplished by the two stout-toothed jaws [Plate XVI., fig. 1*f*] that are placed at the extremity of this organ. When supplied with food, the weevil will live for several days; and even when food is withheld, it may exist for a week. It is capable of flight, having well-developed wings folded beneath its wing-covers. Apparently, it does not make long excursions in this way, although there are grounds for concluding that it can readily traverse an interval ten chains or more in width. Its movements on the wing are almost wholly nocturnal, but it differs from many other beetles in not being greatly attracted by light. Its manifestation of this habit, however, first led to its existence as a destructive insect being revealed to Nietner, the earliest recorder of this feature in its economy [(9), p. 36]. Its well-developed claws and pad-like feet enable it to attach itself firmly to all parts of its food plant, but it will abandon its hold when the object whereon it occurs is shaken. Tucking its rather long legs beneath, it will then remain stationary as if dead. Its faculty for simulating death is, however, not so developed as is this feature in many other weevils. The sexes may occur in different relative numbers at different times of the year. As a rule, the male is the smaller insect. It can be readily, moreover, distinguished by the special form that the antennæ or feelers assume in this sex. In its case this organ is not only longer as a whole, but the end joint occupies far more than half its total length, whereas in the female insect it falls far short of this dimension. Under natural conditions reproduction is soon entered upon. Each female weevil lays several eggs; but these are placed singly in the plant. The following positions may be selected for oviposition:—Anywhere along the course of the vine, but especially as near the base of the stems as possible; along the short lateral roots, and at the ends of the tubers where they and the roots unite. When in process of growth the tubers increase in size, and so not only force the surrounding earth outwards, but also work themselves near the surface; when the soil that has covered them has been partly washed away by rain; or, if of a stiff nature, has caked and fissured under the influence of drought, still lower parts receive the visitations of the beetles that occupy themselves not only in feeding, but also with further egg-laying. When about to deposit its egg, the insect excavates with its jaws a small round hole of but little depth and scarcely exceeding the diameter of the snout in width. In this the egg is placed, being afterwards completely covered up by small fragments of plant tissue in such a manner as to render its whereabouts almost indiscernible. Sometimes apparently a small and suitable fissure may be substituted for the usual excavation. The larva, or

worm, soon hatches out. If in the vine, it confines its attention to the central pith, consuming this as it travels onwards. When in the thicker portions of the stem, it will also mine into the surrounding parenchymatous tissue, and occasion an undue development of this—as a consequence of the irritation that its presence gives rise to—and considerable thickening of these parts. If already at the base of the stem it may continue its mining, well into the tuber. In the tuber itself, it may tunnel in a meandering course just beneath the skin, and so induce the presence of dark tracks of tissue (*vid*. Pl. XV., fig. 1), or work its way to its very centre. Its tunnellings in the potato are carried in all directions, and not necessarily downwards. These it partly fills with brown food dejecta, but not to such an extent as to prevent it from retracing its steps and pursuing its feeding habit along some branch course that it excavates in another direction. When its full size has been attained, and when still within its workings, it closes the passage in which it occurs, both before and behind, with particles, forming thus a cavity about 6 mm. ($\frac{1}{4}$-inch) long and 2 mm. ($\frac{1}{12}$ inch) wide, and ceasing to feed passes, after casting its skin, into the inactive or pupa condition. These cavities, though usually just beneath the skin of the tuber, may be situated well within its substance. When isolated at any time from its surrounding, the grub is a very helpless object, being unable to move—even to the slightest extent—over a level surface; but it will lie on its side with its head curved inwards and wriggle occasionally. The pupa is also inactive, and a very delicate, soft, white object. A further transformation in the same position results in the development of the perfect insect or beetle. This is at first of a general pale-brown colour with the thorax and head yellowish white; but whilst still within the above-mentioned chamber the full colours of maturity—dark steel blue and red—are developed, and with them the hard consistency of the adult. Even when thus advanced towards maturity, the beetle may remain some days in the position in which it has arisen, especially should the weather be cold. But eventually having eaten its way to the surface it fissures the skin, and so effects its escape into open to further feed and increase. J. H. Comstock (13) has found that in Florida but thirty days may be occupied by the insect in undergoing its transformations from the egg onwards. Observations in Queensland have also shown that an equally short period may serve the purposes of full development. Thus several successive generations of weevils may be born during the life of a sweet potato plant—six months and upwards. Infestation, moreover, can take place at any period of its growth, or even after the tuber is not only mature but removed from the soil. When, however, the latter is still in the ground, each generation commences destruction further and further downwards on the stem into the root—the latter in process of development becoming gradually more accessible to attack. The weevil continues breeding throughout the year, but during midwinter (June) a considerable retardation in the time occupied in its transformation may be exhibited. From one to twenty insects or more may inhabit a tuber at the same time, and every stage of growth from between egg and beetle may be represented amongst those present.

NATIVE COUNTRY.

The native country of the sweet potato weevil is, perhaps, no longer ascertainable. It may, however, be affirmed that the discovery of the place of origin of the beetle is of some importance, since it is probable that in the spot where it is indigenous there will be found to occur other insects that are parasitic upon it, and which, therefore, might be made available for checking its increase in the numerous countries to which it has been transported, and in which it now proves so destructive.

There are some grounds for concluding that it is not tropical South America whence its food plant—*Ipomœa Batatas*—is affirmed to have originated.

If, as has been suggested, the beetle be identical with the insect described by J. C. Fabricius towards the end of the last century, in the first instance

under the designation *Brentus formicarius* [(1), p. 549]; then under the title *Attelabus formicarius* [(3), p. 163]; and finally [(3), p. 174], with the name he had first bestowed upon it, then it is on record that more than a hundred years since it was procured from Tranquebar, in the Madras Province of British India, and from the territory that was then spoken of as the East Indies.* The French entomologist, Olivier, writing in 1789-1808 [(4), pp. 84 and 446)], similarly assigned *Brentus formicarius* to the latter locality.

Further, insomuch as it presents characters identical with those attributed to a beetle, named by C. H. Bohemann [(6), p. 369], in 1833, *Cylas turcipennis*, the East Indies, and Java especially, from which the specimens under notice had been derived, may be again looked upon as its source.

However, in a work published during the same year as was the last cited one, le Comte Dejean recorded ((7), p. 244) the fact that his entomological collection already contained a representative of *Cylas turcipennis*, Bohm., from Ile de France (Bourbon); a statement that tends to show—on the assumption that it is not indigenous there—that the wide dissemination of the pest had been quite early effected.

The difficulty in settling the question of its native country is thus very apparent.

With regard to its being a native of Java, in which country, according to Schoenherr ((6) p. 369), Mellerberg obtained it previous to 1833, we have the significant fact that, although the able entomologist, Dr. J. C. Koningsberger, has, in his "Eerste Overzicht der Schadelijke en Nuttige Insecten Java," noticed three other different insects as attacking there the Sweet Potato (*Batatas edulis*),† he is silent as to the occurrence there of the weevil under notice, or, indeed, of any root-devouring beetle whatever.

It might off-hand be concluded that the Sweet Potato (*Ipomœa Batatas*, Poiret), being a native of tropical South America (F. Mueller), the sweet potato weevil had been derived from the same region also; but it is well known that such a consequence of events as this would indicate is not inevitable. Destructive insects have not, as a rule, originated in this way. The injurious relations that they have established with cultivated plants is generally the outcome of a comparatively recently manifested habit, and their early existence has been associated with vegetation not always even botanically allied to that to which they have afterwards proved especially inimical; and thus in the case of attacks upon immigrants, they have not often been derived from the original homes of the latter. In some instances on the other hand there is a constant consortism between specific plants and insects. But it must, nevertheless, be admitted that there is certain circumstantial evidence to lend colour to this theory as to the origin of the weevil:—The former derivation of the sweet potato from South America on the part of the Charaibees and other natives of the West Indian Islands; the early occurrence of the weevil in the latter region; the constant periodical communication between the East and West Indies during the last century, especially on the part of the Danish and French marine; the custom of early voyagers transporting living plants from one place to another; the existence of Bourbon and Tranquebar as port of final destination; the early appearance of the insect in both of these localities. J. L. Leconte has expressed, in opposition to this view, the opinion that the insect "has probably been introduced from Asia" (*vid.* "Classification of the Coleoptera of North America," p. 507, 1880). To conclude: Some light may be expected to be thrown upon this speculation in considering the particular part of the world in which *Cylas*, the genus of beetles that comprises the sweet potato weevil, is best represented; since an insect whose native country is unknown is more likely to have been derived from one in which its congeners especially occur than from

* It must be noted that Tranquebar was formerly the entrepôt in the East Indies for the Nicobar Islands and countries beyond—*e.g.*, Java—especially prior to the Danish deciding to abandon their colonies in this part of the world. Tranquebar may not, therefore, have been the actual place of origin of the insect described by Fabricius.

† This is a synonym of *Ipomœa Batatas*.

anywhere else. Now leaving the assigned habitats of *Cylas formicarius* (cum *C. turcipennis*), that may be all secondary, out of consideration, we find that the African Continent possesses eleven species of *Cylas;* Java (doubtfully), one; and Cochin China (doubtfully), one. This assignment is in accordance with comparative recent publications on the part of Fahraeus, Hartmann, and Faust.

REMEDIAL MEASURES.

A. REPRESSION.—The first indications of the presence of the sweet potato weevil in a crop will be afforded by the occurrence in greater or less profusion of punctures or worm-eaten tracks in the tubers, or primary stems of the plant that are immediately above them, and the existence of living insects in the grub, larval, or beetle condition in connection with these, but concealed well within such affected parts. It seldom, indeed, happens, except to the especially observant and at a time when the mature insect or beetle is abundant, that this is discerned abroad, stationary upon, or slowly crawling over either stems or foliage. Generally speaking, therefore, by reason of this mode of hidden occurrence, and owing to the protection afforded by the plant tissue upon which it feeds, the destruction of the insect cannot be effected by the application of any insecticidal substance.

It will, however, be profitable to resort to some procedure with a view to securing as much of the crop that is assailed by it, as is practicable from its depredations. As a rule the insects that attack the tubers are not the original visitants to the plant, but are the progeny of beetles that are developed in the stems above ground, and which in due course deposit their eggs in such portions of the tubers as are either above or immediately beneath the surface of the soil. It is but occasionally only that the weevil grubs eat their way from the stems into the roots beneath them. Accordingly, when the destructive work of the weevil has commenced, it will be found advantageous to apply soil so as to well cover such tubers as may have become more or less exposed, using preferably sand or a sandy loam for this purpose.

As the outcome of similar considerations also, in anticipating beetle-attack, deep planting should be resorted to, and the sweet-potato plant should be grown upon the flat, and not in ridges, for such procedure will result in a less likelihood of their becoming uncovered. Similarly light soils should be selected for the cultivation of this plant in preference to those that are heavy, and cake and crack when drought is experienced.

When the insect has once found its way into the tuber, every part of this is accessible to its attack. The grubs themselves may tunnel further and further downwards, or the beetles that they give rise to may, after forcing their way into the interstices that come to surround the roots as the soil shrinks from these with the occurrence of dry weather, deposit their eggs in places on the surface of the tuber that had been hitherto uninjured. Accordingly, an affected crop should be dug up, but as speedily as possible it should be converted to some profitable home use, and not directly made to form an article of trade.

Such tubers as exhibit the characteristic evidence of injury, in however slight a degree, should be separated from those that are still sound.* The vines should be burnt; and so, also, should the badly damaged potatoes. This latter action may, too, be accomplished with but little loss, since, when in this condition, they are usually rejected by stock. The slightly damaged tubers should be utilised on the farm as speedily as possible, for, insomuch as the insect's destructive work persists after the sweet potato is removed from the soil, they will otherwise become daily more injured, and therefore less serviceable. More-

* With regard to a general harvesting of a sweet potato crop, it may be remarked that although the difficulties connected with the keeping quality of this esculent are fully recognised, there are grounds for concluding that the tubers when once dug up may be preserved without much deterioration for a considerable period, by recognising the following conditions for success (viz.:—Evenness of temperature, lack of humidity, comparative freedom from exposure to the air to be secured by bedding them in sand or dust), and the absence of such as are unsound or injured. Hence the benefit from allowing the tuber to remain in the ground—a benefit not, however, to be anticipated when weevils are prevalent—may in some measure be otherwise realised.

over, it is desirable to prevent the insects that occur in these from issuing as beetles to affect crops still unvisited by the pest. The latter consideration also points to the necessity of speedily destroying, too, all portions of damaged tubers that may be discarded when the latter are being used. Exclusive utilisation on the farm will tend to prevent dissemination of the latter, for even apparently sound potatoes, if derived from a crop in which the weevil has been found to occur, may still harbour it in the egg or some more advanced stage of its existence, and they may, therefore, serve to accomplish this undesirable result.

Every effort should be made, even to the extent of sacrificing immediately prospective advantages, to rid a farm once visited by the weevil from its presence, since it usually happens—at least, in Queensland—that in places in which it has once been established it becomes a permanent denizen. Insomuch, too, as the insect, as far as is at present known, feeds exclusively upon the sweet potato, with the addition perhaps of some few other species of *Ipomœa* or Convolvulus, this operation is quite a practicable one. It is to be accomplished by abandoning for a season or two the cultivation of this esculent, devoting the land that would have been occupied by it to some other crop. Success, however, is alone to be hoped for by the thorough adoption of this procedure; for a sufficient number of insects may persist, as a source for future injury, if but a few shoots of the plant survive for their food requirements. If, moreover, the cultivation of the sweet potato be abandoned on a few plots here and there upon a farm whilst elsewhere on it its continuous growth is unsuspended, it cannot be confidently expected that the desired end will be accomplished. As a rule the weevils, if present at all, are more widely distributed in a locality than direct observation would suggest, and, moreover, being a winged insect, although not prone to take flight, the passage of the considerable intervals that may occur between one plot and another may be effected. The latter consideration points also to the necessity that exists for farmers generally to co-operate in the adoption simultaneously of this procedure. The present writer already recommended resort to this action as a means whereby the pest might be held in check in 1886 (*cf.* 16), and, had the advice then tendered been followed, the extinction of the insect, whose occurrence was, as far as could be then ascertained, restricted to a small area of the colony situated at but a short distance to the south of Brisbane, might have been well nigh brought about. Such a result indeed has been apparently accomplished in Florida, and by the adoption of similar measures. Thus C. V. Riley and L. O. Howard (*vid.* 19, p. 261) write:—"Where it has been abundant in Florida it has been practically stamped out by following the measures just mentioned"—that is, "burning all potatoes found to be infested," and doing this "carefully and throughout a neighbourhood."

In North-east Queensland the occurrence in some instances of numerous species of native Convolvulus on or in propinquity to the farms may complicate this work of local extermination; but at present there is no scientific evidence to support such a conclusion.

Should public opinion on the part of Queensland farmers be now not sufficiently enlightened, to admit of the voluntary resort on their part to this strenuous effort, and of the abandonment of the *laissez faire* policy hitherto pursued with regard to the sweet potato weevil, the provisions of "*The Diseases in Plants Act*, 1896," can be brought into operation in order to compel action on the part of those of them who may remain indifferent to the results of such neglect; for the occurrence of the sweet potato weevil constitutes a "disease" within the meaning of that measure. The circumstance of the first appearance of the insect in a district may justify the prompt destruction of the entire cultivation in which it has manifested its presence, sound and infected tubers being simultaneously sacrificed.

B. PREVENTION.—A farmer who has temporarily ceased to grow sweet potatoes, in pursuance of the foregoing recommendation, is equally interested in preventing the appearance of the sweet potato weevil with one whose crops

have hitherto escaped its visitation. Moreover, many entire districts in the colony are greatly concerned in obviating its presence. Now, a statement regarding the ways in which the insect is transferred from one place to another will not only teach those interested under what circumstances the arrival of the insect may be anticipated, but will also, whilst doing so, suggest the means to be adopted for frustrating this event.

They may, in the first instance, arrive in sweet potato vines to be used as "sets," or in tubers destined to indirectly accomplish the same purpose. In fact, the giving effect to a desire for "fresh seed" has often been responsible for the first appearance of the insect.

Again, the insect may be introduced in sweet potatoes intended for use for domestic purposes, or that are to be fed to stock, and so too great care cannot, therefore, be taken in regarding this as a source of infestation. At present, it is a daily occurrence for "grubby" sweet potatoes to be placed upon the market at Brisbane, and so to be widely distributed in the course of trading operations. The weevil is again distributed through being contained in ships' stores, and not in the tubers forming part of their cargo only.

Further, after sweet potatoes harbouring the insect have been placed in sacks or other receptacles, the perfect insects or beetles may, in the natural course of their existence, effect their exit, and remain in them even after they have been filled with other merchandise, and so become transported with it. For the beetles are at times—especially during the prevalence of cold weather—somewhat lethargic, and may even simulate death for a considerable period when subjected to any continuous jarring motion.

Similarly they may come forth from diseased potatoes whilst these are being conveyed through farms or along roads bordering them, and drop from vehicles to the ground. As, moreover, they are not infrequently met with in the *débris* that accumulates where sweet potatoes are stored; they may be carried far a-field in boxes or bags, into which they have crawled whilst these have been temporarily placed in such situations.

When occurring in the vines it may be almost impossible to detect their presence, since the larvæ, or "worms," are usually confined to the pith of the stems, to which they are very partial, and scarcely produce any external indication of their occurrence in this situation. Their existence in the tubers may again be readily overlooked. Only a small percentage of those constituting a parcel may harbour the insect, and again those in which it occurs may have but two or three individual insects only present in them. The chances, therefore, that such weevil-infested tubers may be overlooked, even by those conversant with the habits of the insect, are by no means small.*

Unless the measnres of extermination and prevention above advocated are generally adopted on the part of sweet potato cultivators, little benefit will be experienced. Writing on behalf of a number of farmers whose crops have suffered from the ravages of the insect and who have not been able to cope with it, a correspondent states as follows:—"Our potato crops are all from 15 to 30 chains apart; we use fresh land every year, and in no case do we grow two crops in the same land without other crops intervening. For myself [he adds], I use land which has not grown potatoes before every year" [W. J. Tutin]. This illustrates the difficulties that have to be overcome as well as emphasises the necessity for the prosecution of such drastic measures as are above recommended.

* As an instance of the difficulties inseparable from arriving at the true condition of sweet potatoes may be mentioned an event that occurred but a few years since. At that time the writer was accorded an opportunity of examining several bags of sweet potatoes that had been derived from a district in which the occurrence of the weevil was unsuspected, and which were destined to be forwarded to Western Australia for seed purposes. Having special knowledge of all the symptoms denotive of the presence of the weevil, he was not long in discovering its presence. Accordingly, the consignment was held back, and the tubers utilised for horsefeed. Thus they were cut up, and, although this was done by one who was aware of what had transpired, and was, moreover, endowed with more than ordinary powers of observation, no further examples of the insect were brought to light, although it was in the highest degree probable that further examples were actually present.

BIBLIOGRAPHY.

Note.—The following is a list of the works and papers referred to, by number, in the foregoing pages. It, moreover, comprises an index to the literature of the sweet potato weevil, that will be found to be approximately complete. The memoirs 8*, 15*, and 27* have not been consulted for lack of opportunity.

(1) Fabricius, J. C. Entomologica Systematica II., p. 549, No. 13 (1792-4) (*s.v. Brentus formicarius*).

(2) Fabricius, J. C. Do. Supplementum, p. 174, Nos. 5, 6 (1798) (*s.v. ib.*)

(3) Fabricius, J. C. Do. Supplementum, p. 163, Nos. 13-14 (1798) (*s.v. Attelabus formicarius*).

(4) Olivier. Entomologie ou Histoire Naturelle des Insectes, Vol. V., p. 84; bis p. 446, t. 2, fig. 19 (*s.v. B. formicarius*).

(5) Bohemann (C. H.) [*Vid.* Schoenherr.]

(6) Schoenherr (C. J.) Genera et Species Curculionidum. [(*a*) Vol. I., p. 369 (1833); description by Bohemann (*s.v. Cylas turcipennis*, Bohm.); (*b*) *Op. cit.*, p. 370 (*s.v. Cylas formicarius*, Fabr.)]

(7) Dejean (Le Comte). Catalogue des Coleoptéres, Vol. III., pg. 244 (1833) (*s.v. Cylas turcipennis*, Schn.; *syn. C. formicarius*, Dej.).

(8*) Labaam (D. J.) et Imhoff (L.) Singulorum Generum Curculionidum Icones I., No. 25 (1838) (*s.v. C. turcipennis*).

(9) Nietner (J.) "Notizen über *Cylas turcipennis* und andere schadliche Insecten von Ceylon." Entomologische, Zeitung, XVIII., pp. 36-41, Stettin, 1857. [Describes occurrence in north-west Ceylon in 1856, also nature and extent of its ravages.]

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(11) Gemminger (Dr.) et Harold (B. de). Curculionidæ; Catalogus Coleopterorum, Tom. VIII. p. 2458 (1871). [(*a*) *s.v. C. formicarius*, Fabr., *syn. C. brentiformis*, Megerle; (*b*) *s.v. C. turcipennis*, Bohem.]

(12) Le Conte (J. L.) and Horn (G. H.). The Rynchophora of America, North of Mexico. Proc. Amer. Philos. Soc. Vol. XV., 1876.

(13) Comstock (J. H.). Report of Entomologist, Report Commissioner of Agriculture, U.S.A., 1879, pp. 249-50. Pl. VI., fig. x.

(14) Mische (W.) Rare Beetle, Injurious to Sweet Potatoes in Louisiana. American Entomologist, Vol. V. (n.s. Vol. 1), p. 297, Washington, 1880. [Notes on ravages of *Cylas formicarius*.]

(15*) Le Conte (J. L.) and Horn (G. H.) Classification of the Coleoptera of North America (Smithsonian Misc. Coll.), p. 507. Washington, 1883. [Occurrence in Louisiana and Florida, U.S.A.]

(16) Tryon (H.) Diseased sweet potatoes, East Moreton Farmers' Association. *Queenslander*, Brisbane, 3rd July (1886). *Brisbane Courier*, 30th June (1886).

(17) Tryon (H.) Sweet Potato Weevil (*Cylas formicarius* Olivier). "Inquiry into Diseases affecting the Fruit-trees and other Economic Plants in the Toowoomba District, pp. 88-9. " Parliamentary Paper, C.A. 91. Brisbane, 1889.

(18) Tryon (H.) Report on Insect and Fungus Pests, No. 1, pp. 187-188. Brisbane, 1889. (Reprint of preceding article.)

(19) Riley (C. V.) and Howard (L. O.) (*a*) Insect Life, Vol. III., p. 334 (1891). Occurrence in Texas, U.S.A.; (*b*) *Op. cit.* p. 404. [Occurrence in Louisiana, U.S.A.]

(20) Riley (C. V.) Insect Life, Vol. V., p. 261 (1893).

(21) Townsend (C. H. T.) "Notes of the Museum," No. 47 (1893). Institute of Jamaica. Occurrence at Grand Cayman Island, W. Indies. (*Cf.* Insect Life, Vol. VI., pp. 43-4 (1893).

(22) Cotes (E. C.) "A Conspectus of Insects which affect Crops in India." Indian Museum Notes, Vol. II., No. 6, p. 151, 1893. [Occurrence in Ceylon (Nietner). *s.v Cylas turcipennis.*]

(23) Morgan, H. A. Report of the Entomologist, Louisiana Agricultural Experimental Station, Baton Rouge. Bulletin 28, pp. 999 (1893). [Sweet Potato Weevil (*Cylas formicarius*) and other destructive insects described, and their pernicious work noticed.]

(24) Farmers' Bulletin, No. 26, Division of Entomology. United States Department Agriculture (1895).

(25) Webster (F. M.) Insect Immigration in Ohio. Bull. 51. Ohio Agricultural Experimental Station, p. 123 (1894). [Incidentally refers to the migrations in the United States of the sweet potato weevil amongst those of other destructive insects.]

(26) Sanderson (E. Dwight). Sweet Potato Insects. Maryland Agricultural Experimental Station, Bulletin 59, pp. 130-131, 1897. [Summary of articles by J. H. Comstock (No. 13) and H. A. Morgan (No. 23).]

27* French (C.) Handbook of the Destructive Insects of Victoria. Pg. Pl. 1900 [in the Press].

Description of Plates.

PLATE XV.

Fig. 1. Sweet potato tuber, showing characteristic markings due to sweet potato weevil attack.
,, 2. Transverse section of same showing tunnellings.
,, 3. Longitudinal section of young tuber completely destroyed by insect.
,, 4. Basal portion of main stem of plant, showing characteristic thickening.

(From Photographs by C. J. Wills.)

PLATE XVI.

The Sweet Potato Weevil (*Cylas turcipennis*, Bohm.; *C. formicarius*, Fabr.)

1.	The Beetle, hairline showing natural size.	Magnified representation.
1*a*.	,, side view.	,, ,,
1*b*.	Wing of Beetle.	,, ,,
1*c*.	Tarsus ,,	,, ,
1*d*.	Antenna of Male.	,, ,,
1*e*.	,, Female.	,, ,,
1*f*.	Mandible.	Magnification 110 times linear.
2.	Pupa, side view.	Magnified representation.
2*a*.	,, ventral view.	,, ,,
3.	Larva.	,, ,,
3*a*.	Labrum (upper lip).	Magnification 110 times linear.
3*b*.	Labium (lower lip and maxillæ).	,, ,,
3*c*.	Mandible.	,, ,,

1, 1*a*, 2, 2*a*, from drawings by C. J. Wills; remaining figures from drawings by writer reproduced by C. J. Wills.

SNAKES' EYES.

On more than one occasion we have seen a man walk up to a coiled-up carpet snake and seize it by the neck, the reptile apparently taking no notice of its assailant until its neck was firmly compressed, yet one of the most curious facts with regard to snakes is that their eyes are never closed. Sleeping or waking, alive or dead, they are always wide open. This is because there are no eyelids. The eye is protected only by a strong scale, which forms a part of the epidermal envelope, and is cast off in a piece with that every time the reptile moults. This eye-plate is as clear and transparent as glass, and allows the most perfect vision, while, at the same time, it is so hard and tough as to perfectly protect the delicate organ within from the thorns and twigs among which, in flight from enemies or in pursuit of prey, the reptile so often hurriedly glides, as any close observer of the habits of the snake can readily discover.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1899.								1900.				
	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.
North.													
Bowen	1·46	Nil	0·63	0·21	0·06	0·56	Nil	2·92	7·61	0·40	0·88	0·59	0·89
Cairns	4·03	0·63	2·01	1·31	3·23	0·74	0·33	4·57	43·06	1·98	8·90	3·77	3·56
Geraldton	12·61	1·64	8·93	2·85	9·03	1·03	Nil	4·89	62·26	2·36	8·86	8·86	8·33
Herberton	1 49	0·66	0·23	0·36	1·62	0·18	2·75	0·73	11·90	0·23	1·97	2·19	0·57
Hughenden	0·01	0·20	0·46	2·05	Nil	0·45	1·05	0·33	6·43	1·04	0·01	Nil.	0·11
Kamerunga	...	...	...	...	...	...	...	...	...	1·01	8·60	3·25	3·65
Longreach	0·58	0·60	1·08	0·28	0·06	0·27	0·67	Nil	1·68	0·48	Nil.	Nil.	0·14
Lucinda	1·71	0·40	2·78	0·80	0·97	0·02	1·26	1·02	37·35	1·71	4·90	4·44	9·08
Mackay	4·74	Nil	2·29	2·37	1·33	0·19	0·49	7·65	20·86	0·65	4·12	2·40	2·89
Rockhampton	2·49	0·40	2·23	1·71	1·96	2·35	1·22	11·02	4·53	0·25	1·64	0·93	1·38
Townsville	0·59	Nil	0·78	0·89	0·01	0·35	0·16	0·53	21·09	0·07	1·68	0·87	2·31
South.													
Barcaldine	0·39	0·05	1·03	0·53	0·27	0·94	0·52	0·04	3·08	0·65	0·09	2·03	1·38
Beenleigh	3·06	5·70	6·95	2·02	3·11	2·53	1·80	7·40	5·42	3·19	3·16	1·25	7·55
Biggenden	...	...	...	...	...	...	...	...	...	0·40	2·81	0·28	3·06
Blackall	0·13	0·20	1·11	0·57	0·16	1·20	0·04	0·85	1·73	1·31	0·63	0·63	2·19
Brisbane	1·54	2·75	3·50	1·43	2·48	2·26	2·33	7·61	6·51	5·18	3·37	1·38	5·45
Bundaberg	2·92	1·42	2·33	2·62	1·67	1·60	0·06	7·62	4·63	0·86	1·86	1·15	3·97
Caboolture	2·06	2·67	4·61	1·90	2·40	2·30	2·23	7·44	3·04	4·18	5·66	1·42	7·04
Charleville	0·06	0·25	0·33	1·26	0·55	0·36	0·43	0·16	1·01	0·08	0·79	Nil.	1·15
Dalby	1·20	1·33	1·67	1·09	1·20	1·44	1·84	2·89	0·41	6·31	2·80	2·46	2·54
Emerald	2·43	0·03	1·31	2·08	1·96	1·93	1·32	0·40	3·08	1·22	3·97	0·42	2·72
Esk	1·89	2·40	2·59	1·69	2·79	2·67	2·25	5·34	1·42	2·34	4·73	1·50	4·78
Gatton College ...	1·33	1·18	2·01	1·55	2·19	2·13	3·50	5·87	2·40	4·07	3·13	2·24	4·24
Gayndah	1·26	1·30	0·86	3·34	1·24	2·73	4·59	7·37	2·52	2·07	1·11	1·22	2·57
Gindie	...	...	...	...	...	...	...	...	...	0·57	1·04	0·96	3·01
Gympie	2·89	3·57	2·26	1·23	2·11	2·41	0·39	6·44	5·59	1·84	2·76	1·05	3·63
Ipswich	1·41	1·82	2·42	1·29	2·77	2·04	3·46	4·66	2·79	1·66	1·85	1·47	4·73
Laidley	1·63	1·32	2·00	1·82	5·04	3·17	2·40	6·50	0·64	3·15	2·87	1·94	4·36
Maryborough	3·35	4·20	1·71	1·49	2·29	1·20	0·51	4·13	4·88	1·78	3·26	1·17	4·33
Nambour	3·79	6·17	4·18	1·81	3·13	2·87	3·03	11·11	4·07	5·64	4·67	2·78	7·77
Nerang	2·28	3·34	9·80	2·52	4·74	1·99	1·42	6·31	4·60	3·37	3·06	0·47	1·28
Roma	0·26	0·53	1·05	1·00	0·55	0·35	1·27	0·99	0·43	1·52	4·40	0·23	2·07
Stanthorpe	1·20	1·36	3·11	1·08	1·63	1·36	0·86	3·22	2·62	4·81	1·87	1·70	3·17
Taroom	1·35	0·61	1·27	1·60	1·55	0·83	3·32	0·65	1·78	3·65	2·92	2·11	2·55
Tambo	0·15	0·60	1·16	0·74	0·27	0·79	0·08	0·66	2·28	1·55	0·30	0·02	2·94
Tewantin	6·87	9·28	5·00	3·67	2·80	3·36	0·46	8·22	1·69	4·87	5·36	1·02	5·90
Texas	0·50	3·26	2·95	1·38	1·72	0·97	0·74	2·67	1·56	3·39	1·63	1·48	3·35
Toowoomba	1·33	2·11	1·75	1·63	3·15	1·43	2·36	4·75	1·01	2·90	2·87	2·00	4·67
Warwick	1·03	1·53	2·44	1·00	1·99	2·48	1·67	3·83	1·84	4·19	1·93	1·01	3·31
Westbrook	...	...	...	...	...	...	...	...	...	3·71	1·78	1·81	3·04

A. W. ANDERSON,
Acting Government Meteorologist.

QUEENSLAND PRODUCTS IN BRITISH MARKETS.

BUTTER.—Australian, 88s. to 92s, demand falling off; choicest New Zealand, 90s. to 94s.; coloured, 60s. to 61s.; choicest Danish, 105s. to 108s. per cwt.

CHEESE.—New Zealand choicest, 55s. to 56s. per cwt., market dull (July 15).

SUGAR.—Refined, £14 10s. to £15 5s. per ton; syrups, £9 10s.; Java, £9 10s. to £10 10s. per ton; German beet, 88 per cent., 10s. 9d. to 10s. 11d. per cwt.

SYRUPS.—4s. 9d. to 11s. per cwt.

MOLASSES.—5s. to 6s. per cwt.

RICE.—Patna, 13s. to 18s. 6d.; Java, 13s. to 18s. to 24s. per cwt.

COFFEE.—Finest Coorg peaberry, 80s. per cwt.; Ceylon plantation, 55s. to 78s. per cwt.; bold blue, 70s. to 78s.; Santos, 37s. 9d. to 40s.; long berry Mocha, 85s. to 108s. to 135s.

Arrowroot.—Natal, 6¾d.; St. Vincent, 3⅜d.; Bermuda, 1s. 6d. to 2s. per lb.

Wheat.—Australian, 29s. 6d. per 496 lb., about 3s. 8¼d. per bushel; American, 31s. 6d. to 32s. per quarter; German, 32s. to 33s. per quarter.

New Zealand Oats.—22s. to 26s. per 384 lb.

Ginger.—Calicut, rough, 22s. to 23s. per cwt.; medium, 65s. to 100s. per cwt.; Jamaica, good bright, 71s. to 73s.; middling to fair, 63s. to 66s. 6d.; middling, 54s. 6d. to 61s.; 46s. 6d. to 52s. for common per. cwt.

Pepper.—Long red and chillies, 56s. to 75s. per cwt.

Tobacco.—Prices for pipe tobacco on 1st June, 1900:—Pipe tobacco—Kentucky leaf: Common to fair, 3d. to 5½d.; coloury, good to fine, 7½d. to 9½d.; Kentucky strips: Common to good, 3½d. to 7½d.; fine, 8d to 11d.; Virginia leaf: Common to fair, 3d. to 6d.; coloury, good to fine, 8d. to 13½d.; Virginia strips: Common to good, 4d. to 8d.; fine, 8d. to 12½d. Cigar—Sumatra, 7d. to 5s.; Manila, 3d. to 4s.; Havana, 8d. to 5s.

Wine.—Fair red wine (Australian claret type) in bond, 2s. to 2s. 6d. per gallon; fine old quality, 4s. 6d. per gallon; ordinary London port, £10 per pipe of 110 gallons; Marsala, £12 per pipe of 96 gallons.

Green Fruit.—Apples—South Australian, 14s. to 17s.; Tasmanian, 14s. to 18s.; New York, 14s. to 18s. Pineapples, no quotation. Oranges, 16s. 6d. to 21s.; selected, 24s. to 36s. per 420; others, 12s. to 15s. per 200. Bananas, 10s. to 14s. per bunch; out of condition, 7s. to 8s. per bunch.

Eggs.—Australian, none quoted; Irish, 6s. 3d. to 6s. 6d. per 120; Danish, 8s. 3d. to 8s. 4½d. per 18 lb.; French, 8s. to 8s. 6d. per 120.

Honey.—Californian, 44s. to 45s.; Peruvian, 21s. 6d. per cwt.

Olive Oil.—£50 per tun (252 gallons); Eating oil, 4s. to 5s. per gallon; Linseed oil, £31 per tun.

Sisal Hemp.—£18 to £30 per ton.

Wool.—At the wool sales in London held on 13th July, there was a good demand, and prices were well maintained. The average prices realised for various colonial clips were:—Darr, 17⅝d.; Claverton, 17¼d.; Waroonga, 9¾d.; Downie, 11⅜d.; Newstead, 11d.; Burra, 7⅛d.; Kinloch, 7⅛d.; Bushy Park, 8⅜d. On the 15th July, bidding was spirited, and the above improvement was maintained. Average prices were:—Killanoola, 10¾d.; AM, 10⅜d.; Werrina, 17⅝d.; Jerilderie, 9½d.; Bundars, 9⅛d.; Elms, 10½d. The wool sales closed on the 20th July.

Frozen Meat.—The latest quotations to 14th July for the various descriptions of frozen meat are:—New Zealand mutton (crossbred wethers and maiden ewes): Canterbury, 4⅜d.; Dunedin and Southland, 3$\frac{15}{16}$d.; North Island, 4⅛d. Australian mutton (crossbred and merino wethers): heavy (over 50 lb.), 3$\frac{11}{16}$d.; light (under 50 lb.), 3⅝d. River Plate mutton (crossbred and merino wethers): heavy, 4$\frac{1}{16}$d.; light, 4d. New Zealand lambs: Prime Canterbury (32 lb. to 42 lb.), 4⅞d.; fair average, 4⅜d. Australian lambs: fair average, 3⅞d. Australian frozen beef: fair average quality, ox, fore-quarters (100 lb. to 200 lb.), 3¼d.; hind-quarters (180 lb. to 200 lb.), 4½d. New Zealand frozen beef: fair average quality, ox, fore-quarters (100 lb. to 200 lb.), 3½d.; hind-quarters (180 lb. to 200 lb.), 4⅝d.

The above prices are the official quotations furnished by the Frozen Meat Trade Association. The basis of quotations is sales of lines of not less than 100 carcasses of mutton or lamb, or 25 quarters of beef. All the quotations for mutton are for average quality. Quotations for New Zealand and Australian lambs do not include sales of small lambs, or heavies, or inferior quality.

Bacon.—51s. to 66s. per cwt. for lean sizeable; fat, stout, 52s. to 58s. per cwt.

Hams.—Canadian, 56s. to 60s. per cwt. Irish (smoked): special brand, 86s. to 88s.; light weight, 51s. to 52s. 6d. per cwt.

Tallow.—On 18th July, mutton tallow, fine, brought 27s. 6d., and medium 26s. per cwt. Beef tallow, fine, 27s.; medium, 25s. 6d. per cwt.

General Notes.

A PROBLEM.

A southern contemporary puts forward this conundrum; perhaps a Queensland farmer can solve it: A man who, some time ago, started pig-farming in New England (N.S.W.) has been ever since very hard at work, not only with his pigs, but on a problem that takes up the whole of his spare time. It seems he gets about 2d. per lb. all round for his produce; to make it into bacon, he knows, costs just about another 1d. per lb. Nevertheless, if he happens to want some bacon he finds he has to pay 9d. or 10d. per lb. for it. And now he's trying to figure out where the difference goes—so far unsatisfactorily, because he is certain that neither the wholesale merchant nor the country storekeeper wants more than a fair and equitable profit.

OAT CROPS IN NEW ZEALAND.

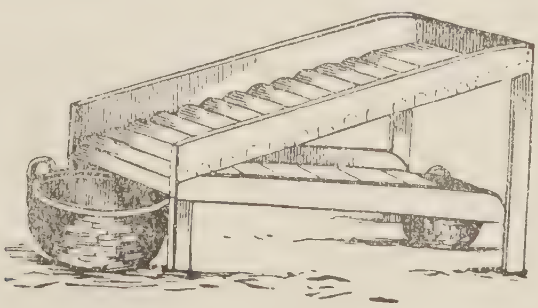
Mr. G. Robertson, a farmer near Cave, New Zealand, threshed 2,200 bushels of first quality Danish oats from 20 acres, or 100 bushels per acre. Another Maoriland farmer, of Rongotea, got 84 bushels of sparrow-bill oats per acre after a large quantity had shelled out. He also got 54 bushels of barley per acre.

TESTS IN PRESERVING FRUITS.

A German horticultural journal reports, in a recent number, certain tests of methods of preserving fruits, as follows:—Fruit was (1) packed in turf-dust in boxes, and the boxes stored in a cellar; (2) in turf-dust in boxes after being wrapped in tissue-paper; (3) wrapped in tissue-paper, packed in turf-dust in boxes, and the boxes buried in the ground, 18 inches deep; and (4) wrapped in tissue paper and laid on racks in a fruit storage cellar. Fruit thus preserved was exhibited at the agricultural fair, held at Frankfort, Germany, in June last year. Wrapping in tissue paper and packing in turf-dust gave the best results, all fruits considered; and this method is thought to be a valuable means of prolonging the keeping periods of desirable market fruits, especially apples.—*Australian Field.*

AN INGENIOUS POTATO-SORTER.

Herewith is shown a device for rapidly and easily sorting potatoes as they are taken from the rows. The upper incline has, crosswise, rounded strips, with spaces between, as a flooring. As the potatoes pass down the incline the small



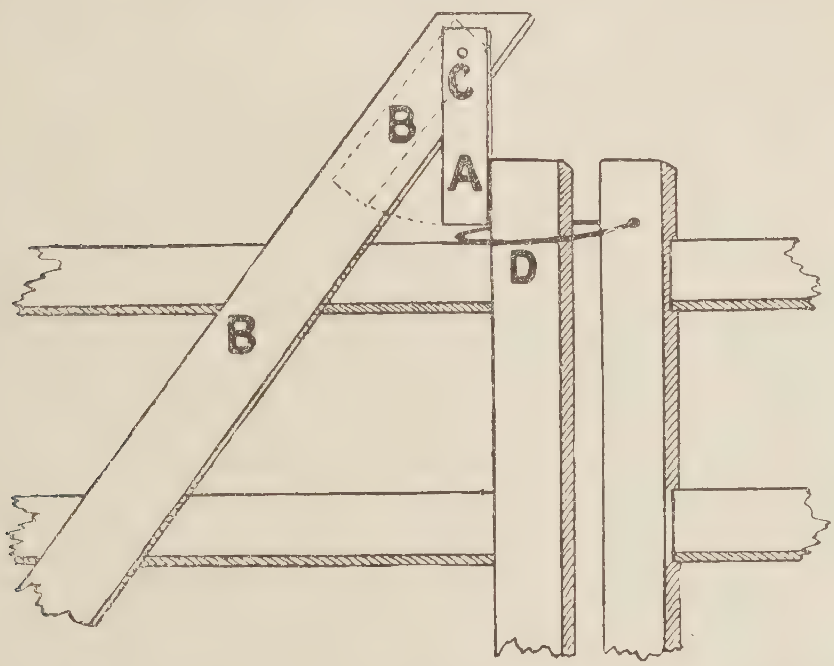
ones fall through the openings into the lower incline, the large tubers falling into one basket and the smaller ones into the other. The rounded strips do not bruise the potatoes.—*Australian Field.*

SPRAYING FRUIT TREES.

It is in spraying fruit trees to preserve the crop that damage is done to the bee-keeper. Paris green is the usual insecticide that bees fall a prey to. Hellebore, too, in the powder is one of the main causes of death, as it would appear that the bees gather it and carry it to their hives as pollen. In America fruitgrowers dress the trees before and after blooming, and thus, to a great extent, they avoid causing the deaths of thousands of bees.—*Australian Field.*

A SIMPLE DEVICE TO PREVENT HORSES RUBBING OFF GATE CATCHES.

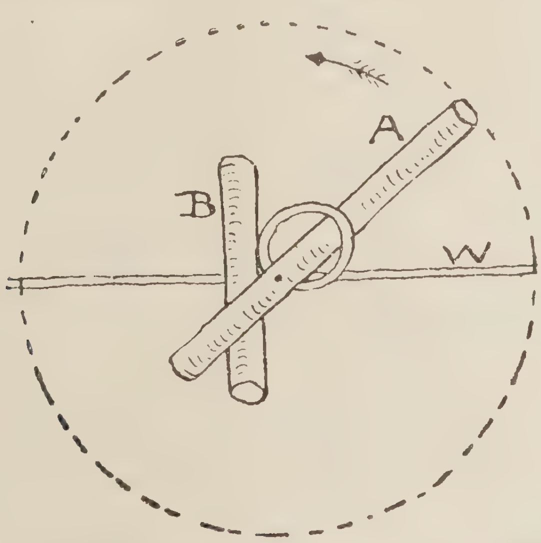
Bar A hangs from bar B by means of single bolt C, so that its weight always keeps it in position, and it thus keeps the wire D from being rubbed by



horses or cattle. It should be constructed so that the bar A hangs loosely and will always drop into position.—*Australian Pastoralists' Review.*

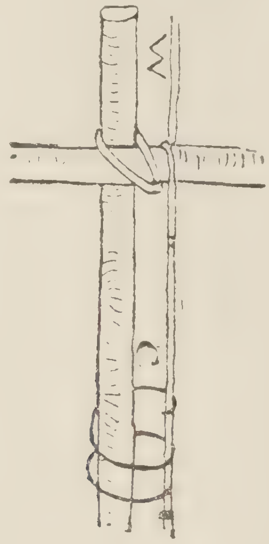
TO TIGHTEN FENCING WIRE.

From the *Australasian* we take the following sketches of a wire-tightener, which will aid settlers in what is sometimes a very troublesome business:— "There are two round sticks (A) 2 feet long and (B) 18 inches in length, and



$1\frac{1}{2}$ inches in diameter; W represents the wire. Make a loop in the wire to be tightened, and place the longest stick through the loop, with the short one in the position shown in Fig. 1. Hold the short stick with one hand, and turn

the other in the direction of the arrow until the wire is tight, when the whole is secured in place by a piece of wire (C), as shown in Fig. 2."



A PETRIFED FOREST.

The petrified forest of Arizona will probably be included in a National Park by action of Congress. This forest, which possesses extraordinary geologic and scenic interest, is included in an area ten miles square in the north-west part of Apacho Co., Arizona, with the nearest railway station only a few miles off, at Adamawa, on the Santa Fé R.R. In this region, cut up by canyons and ravines, are thousands of solidified tree trunks and fragments of trees, mingling with the red, brown, white, and purple of the sandstone formation. In one place a petrified tree trunk spans a ravine nearly 50 feet wide, and forms a footbridge. Professor Lester F. Ward, palæontologist of the Smithsonian Institution, dates this forest back to the Triassic, or early part of the Mesozoic, period. The trees are supposed to have once been washed down to an ocean bed that has since been elevated 6,000 to 7,000 feet above the sea.

CURING LIBERIAN COFFEE.

One of the drawbacks to the use of Liberian coffee has been a strong unpleasant taste, and various remedies have been suggested. It has now been successfully overcome on the Borneo Coffee Company's estate, in Marudu Bay, by washing the coffee after pulping and before fermenting. The washed coffee is in this way cleaned from all the minute bits of pulp, which doubtless imparted an unpleasant taste, and before being placed in the fermenting cistern it is thrown into large baskets—"coal baskets"—for a few minutes to allow the surplus water to drain off, and is then fermented in a comparatively dry state. To increase the heat, sacks are placed on the top of the coffee, and after some hours the top layer is turned in below so as to ferment the parcel equally. Liberian coffee, properly cured, has a splendid flavour which is well known by the trade, who value it highly owing to the amount of chicory it can assimilate. As an after-dinner coffee nothing comes up to pure Liberian coffee if properly cured.—*British North Borneo Herald.*

TO DESTROY SPARROWS.

A small quantity of crushed wheat, mixed with plaster of Paris and a little flour and sugar, is said to be a good recipe for destroying sparrows. This mixture should be placed on a board out of the reach of fowls and other animals. The sparrows partake of it freely; and as the effects are not immediate, the cause of the after-trouble is not suspected, for, though the birds die in hundreds, others still partake freely of the food.

Plate XVII.

1. Log Timber Exhibits.
2. Biggenden State Farm Exhibits, Biggenden Show.

DONALD'S PATENT WOOL PRESS.

The New Zealand Loan and Mercantile Agency Company, Limited, displayed a very fine collection of machinery on the show ground during the June show of the New South Wales Sheepbreeders' Association, comprising the Walter A. Wood's reaper and binder and mower, Mitchell and Co's. stripper and winnower, and the Donald patent wool presses.

Two of the presses were shown, one being in operation, which attracted the attention of a great many woolgrowers. This press is constructed so that the pressure is all on the carriage, which can be freed from the box for the bale to be seen, and the pressure is brought to bear by means of two ratchets, one on each side of the box, that will stand a pressure of 25 tons. This pressure requires no foundation, and can be worked in a paddock as well as in a wool-shed, and can be shifted easily from place to place, as it only weighs 6 cwt. The boxes are of angle iron, which gives the press a great strength, and classifies it as one of .the strongest on the market.

The sewing can be completed before the pressure is taken off, owing to the bale being freed from the box, which is a great advantage. The working of the whole press is very simple and easy, and far superior to any other press. Two men can easily turn out 40 to 45 bales a day.

BIGGENDEN STATE FARM EXHIBIT.

One of the best and most tastefully grouped exhibits in the agricultural section at the Agricultural Show lately held at Biggenden was that of Mr. H. L. Tardent, manager of the Biggenden State Farm. It included, amongst his varied assortment of well-grown produce, sugar-cane grown on the farm, which those visitors from Maryborough who were qualified to judge said was quite equal in growth to any cane produced on the sugar lands of the coast. The whole exhibit was most comprehensive, and elicited much favourable criticism.

AGRICULTURAL AND HORTICULTURAL SHOWS.

The Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may have been decided on.

The Markets.

AVERAGE TOP PRICES FOR JUNE.

Article.		JUNE. Top Prices. £ s. d.
Bacon	lb.	0 0 7
Bran	ton	6 3 4
Butter, First	lb.	0 0 11½
Butter, Second	,,	0 0 7⅙
Chaff, Mixed	ton	4 3 4
Chaff, Oaten	,,	5 6 8
Chaff, Lucerne	,,	3 18 4
Chaff, Wheaten	,,	3 3 4
Cheese	lb.	0 0 7
Flour	ton	8 11 8
Hay, Oaten	,,	5 18 4
Hay, Lucerne	,,	3 5 0
Honey	lb.	0 0 1½
Rice, Japan (Bond)	ton	14 16 8
Maize	bush.	0 3 4⅓
Oats	,,	0 3 9
Pollard	ton	6 3 4
Potatoes	,,	4 11 8
Potatoes, Sweet	,,	1 15 10
Pumpkins	,,	1 16 8
Sugar, White	,,	17 10 0
Sugar, Yellow	,,	14 0 0
Sugar, Ration	,,	11 0 0
Wheat	bush.	0 3 4⅓
Onions	cwt.	0 5 5
Hams	lb.	0 0 10
Eggs	doz.	0 1 5⅓
Fowls	pair	0 3 6
Geese	,,	0 5 10
Ducks, English	,,	0 3 2
Ducks, Muscovy	,,	0 4 4
Turkeys, Hens	,,	0 7 6
Turkeys, Gobblers	,,	0 15 0

ENOGGERA SALES.

Article.	JUNE. Top Prices. £ s. d.
Bullocks	7 18 9
Cows	5 6 3
Wethers, Merino	0 15 5¼
Ewes, Merino	0 11 7½
Wethers, C.B.	0 15 4½
Ewes, C.B.	0 14 4½
Lambs	0 13 0¾
Baconers	1 15 0
Porkers	1 1 3
Slips	0 9 3

Orchard Notes for August.

By ALBERT H. BENSON.

The planting of deciduous trees should be completed by the end of this month in all parts of the colony, but evergreen trees can be transplanted during seasonable moist weather at any time of the year if the operation is carefully carried out. When set out, the young trees must be cut hard back to a height that in no case should exceed 2 feet from the ground, and in warm dry districts half of this height is to be preferred. Cutting back at planting insures a strong and vigorous young growth, whereas by neglecting to cut hard back at planting the future growth, vigour, and symmetry of the tree are greatly impaired if not completely spoilt. The pruning of all deciduous trees must also have been completed; and all citrus fruit trees from which the fruits have or should have been gathered should be gone over carefully, all dead and badly diseased wood should be removed, and any crossing or superfluous branches, or water sprouts, should be cut away. When the trees are badly attacked by scales this pruning should be severe, in order that the remedies used for dealing with these pests may have a fair chance, as when the top of a citrus tree is allowed to grow like a mat it is impossible to get the spraying material on to the parts where it is most wanted. Spraying should be systematically carried out in every orchard in the colony during this and the preceding month, and in the case of fungus diseases on deciduous trees during the following month as well. Spraying is just as essential an operation as the gathering of the fruit; and no fruitgrower who wishes to make fruitgrowing a success can afford to neglect it, as it is impossible to breed disease in fruit trees and to grow fruit profitably at one and the same time. A full description of the operation of spraying and of the most approved remedies was published some time ago in pamphlet form by the Department of Agriculture, so that any grower who has not received a copy and who desires to obtain the necessary information may obtain it by writing to the Department. After pruning and spraying, the orchard should be ploughed; so that all weeds and trash can be buried, and also that the land that has been trodden down firm shall be broken up. Use a short American plough that will take a wide furrow and turn it right over. The depth at which to plough will depend on the treatment the orchard has previously received and on the nature of the soil. If the soil is shallow, or if the land has never been worked, then the ploughing must be shallow or the roots will be badly injured; but where there is plenty of soil and a perfect sub-drainage, then the ploughing can be from 4 to 6 inches in depth (provided the land has been previously cultivated) without any injury to the trees. In fact, in such soil surface roots are not required, and the trees stand dry weather best when deeply rooted. Grape vines attacked with black spot, where they have not been dressed with sulphate of iron previously, should be treated during the earlier part of the month; and this treatment should be followed in the earlier parts of the colony with a spray of Bordeaux mixture towards the end of the month or just before the buds burst into leaf.

Quick-acting artificial manures, such as sulphate of ammonia, sulphate of potash, or superphosphate, can be applied during the month, but care should be taken not to apply too large a quantity at once, as owing to their extreme solubility a considerable portion of them is apt to be washed out and lost by heavy rains. In conclusion, one more word about spraying, and that is: Do your utmost to stamp out diseases in new districts as soon as ever they make their appearance. Do not consider any disease too trivial, and that it can be

well let alone to a more convenient time, as the more convenient time will not come; but the disease will flourish and spread rapidly, so that what might have been checked, if not eradicated by half-an-hour's work, will now take the grower all he knows to get the better of it. In spraying, whether for insects or fungi, a knowledge of the pest to be treated, combined with carefulness and promptitude, are the essentials of success.

In notes of this kind it is impossible that they can apply equally to every part of the colony, but they will be found to be about an average. Very early districts will sometimes require the notes of a month later, and very late districts those of a month earlier; but this will right itself when a year's notes have been written.

Farm and Garden Notes for August.

Farm.—Clean the crops put in last month. Activity in the field during this and the followidg month will be richly repaid at harvest time. Plant potatoes, maize, rice, yams, arrowroot, ginger, and sugar-cane Maize for an early crop should be sown, and also pumpkins. Lucerne, clover, and Swede turnips may now be sown. Sweet potatoes may be planted whenever vines are available, towards the end of the month. Where potatoes have been planted early, in sheltered positions, hill them up, but not to a sharp ridge, or the rain will be thrown off instead of finding its way to the roots. If grasses are not yet sown, do so at once. Weeds will soon be asserting themselves, therefore all growing crops should be kept clean.

Fourcroya gigantea and Sisal hemp may be planted. Plants of the latter may be obtained from the Department of Agriculture.

Kitchen Garden.—Peas sown during this month should be in beds with a cool aspect. Sow French beans, brocoli, Brussels sprouts, lettuce, endive, parsley, pumpkins, melons, cucumbers, radishes, rhubarb, tomatoes, carrots, cabbages, cauliflowers, turnips, parsnips, spinach, potatoes, &c. Keep the crops clear of weeds, and destroy all aphis-infested plants. Plant out horse-radish, rhubarb, herbs, sea-kale, asparagus, Jerusalem artichokes, ginger, &c. It will be found advantageous at this season to sow the land with salt before digging, at the rate of about 7 lb. or 8 lb. to the perch, as this will sweeten the land, destroy aphis, discourage weeds, fungus, and mildew, and retain moisture. Keep all crops clear of weeds.

Flower Garden.—All pruning, planting, digging of beds and borders, and repairing walks and lawns, should be completed during this month. Stake and tie all trees and shrubs that may require it. Clip hedges and edgings. Plant out antirrhinums, hollyhocks, pansies, verbenas, petunias, &c. Sow phloxes, amaranthus, zinnias, coxcombs, balsams, chrysanthemum tri-colour, cosmia, sweet peas, lupins, &c. Plant gladiolus, tuberose, crinum, amaryllis, pancratium, ismene, belladonna, lily, and other bulbs. It is rather soon to plant dahlias, however. These would be more advantaged by placing them in some warm moist spot, when they would start gently and be ready for planting out a month or two later.

Horticultural Notes for August.

By PHILIP MAC MAHON,
Curator, Botanic Gardens, Brisbane.

The plants are awakening from their winter's sleep, and are once again demanding the greatest attention from those who love them. The month of August corresponds to the month of February in Europe, except that vegetable life is much more advanced and the awakening to the genial influence of sun and warm air is not so protracted and sluggish as in the land of mist, and snow, and fog. The mean shade temperature of the month in Brisbane is 60 degrees, the mean rainfall in 38 years was 2·07 inches. In the year 1898, of which the figures are to hand, and which may be accepted as a typical year, this rainfall was closely adhered to, the total for the month being 2·019 inches. This amount was distributed over 13 days, but there was one comparatively wet day upon which over an inch of rain fell. A dry month, August, as a general thing. In 1898 the highest shade temperature was 78·4 degrees at 2 p.m. one day, and the lowest 41·3 degrees at 7 a.m. on another day. You will note that the heat is fiercest at about two hours after noon, and lowest about two hours after sunrise. When the earth begins to get warmer, the young roots of the plants begin to develop and to go foraging for food, and if you transplant at that time you will, of course, tear off these young roots, and you can imagine the results; therefore, get all the transplanting done as soon as ever you can of those plants especially which begin to first move under the influence of the sun's rays. And which are these? Well, you would naturally expect those plants which, in the homes of their youth, had not so large a share of the sun's genial presence, to feel his influence first. And so it is. The plants of temperate climes begin to move first, while those of more tropical lands wait until the full measure of sunshine, which is their birthright, is given to them before they begin to send their roots abroad in search of provender. Tropical plants can therefore wait a little time, but let all others be moved without delay if they are to be moved at all this season. If there is one thing more than another which conduces to success in the planting of shrubs and trees, that thing is perfect drainage. Many are under the impression that because the sites of their trees are on slopes from which there are good falls, there is no necessity for providing a get-away for the surplus moisture. Yet if a hole be dug on any of the sites, it will be found, in the great majority of cases, that it will become filled with water after heavy rain, and that such water will take quite a time to percolate through the surrounding earth. This is fatal to any plant which may be called upon to occupy that particular spot. All ground formation should now be hurried forward. The present is a particularly favourable season for the formation of lawns. In large places there is a coolness and sense of space and airiness in a good lawn which is not only conducive to the health of the persons occupying that place, but which exercises a considerable influence upon their thoughts as well. The moral and humanising effects of beautiful surroundings are happily every year attracting more and more the attention of those persons in power who alone can bring them within the reach of the poor as well as of the rich. Very often the relative merits of different grasses for lawns come in for a share of discussion, and I am often asked to advise on the subject. Couch grass is, beyond all doubt, the best for a lawn upon which lawn tennis or croquet is intended to be played. Even when it is not intended to use the lawn for this purpose, if time can be spared to keep it always well mown and rolled, the couch grass

is still preferable; but it soon gets ragged if at all neglected, and rank weeds and stronger grasses take possession, and the lawn becomes an eyesore. On the other hand, buffalo grass takes care of itself much better than couch, and, given a friable, sandy loam, will grow with great vigour, and form a rich, verdant carpet. It takes to the mowing machine very well, and, when kept carefully cut, looks extremely well, and forms a most satisfactory lawn for general purposes. If cuttings with roots attached are inserted at about 8 inches apart, it will soon take possession. Where a grass is required for covering slopes, this is the best, as it sends its runners in every direction and binds the bank.

At this time of year, and during the past month, a plant which has attracted much attention has been the brilliant scarlet *Poinsettia pulcherrima.* The floral leaves, or bracts, surrounding the small and comparatively insignificant real flowers form a most brilliant group, and the plant being of such excessively easy cultivation and so easily satisfied as to soil and attention, one wonders that it is not more generally cultivated. All that is necessary is to take cuttings about 12 inches long as the plant goes out of flower—that is to say in a week or two from now—and to put them in the earth firmly in the place where the plants are intended to flower. They will grow quite freely. The plant is not much troubled by drought, and nothing can excel it for decoration at this time of year, when decorative material is so much in demand and when it is so relatively scarce. When the plants go out of flower they may be cut down to within a few inches of the main stem, but if they are left without pruning they will form quite large and conspicuous shrubs, though the flowers will be comparatively small.

Bulbs are now coming into flower. In a recent number of the *Journal* I dealt with these attractive plants. When they are in active growth they require abundance of water, and it is a very good thing to give them, say once a week, a watering with liquid manure. You cannot do without a liquid manure tub in your garden, no matter how small that garden may be. It enables you to supply needed food to any plant at a moment's notice in the most readily usable form, and in the most economical way. If the manure tub (liquid) is only a small one, fill a large stocking with soot and sink it in the tub. You will be surprised at the difference this will make in giving the foliage of your plants a bright glossy look. Gladioli will now be moving. It is well to look after the staking of these plants early, as if you let them become set at first they always take on a most unnatural appearance when you come to stake them afterwards. I always think it is better not to stake a plant at all than to drag it into such a position as it never would have assumed if left to itself, and which evidently causes it pain—that is if a plant can feel pain, which I verily believe it can and does. There is nothing on an exhibition table which is so attractive as a prettily staged group of Gladioli. There is such a charming variety of colours to choose from now, and I am sure that any of my good friends the nurserymen of Brisbane will be glad to suggest to you a variety from the large stocks which I have had the pleasure of examining during the last season. Bulbs should be selected for planting now, when one can form an idea of the harmonies of colours which they present. They can then be removed in the proper season. It is one of the fascinating delights of gardening that you must always think twelve months ahead, and, like the would-be successful general, make your combinations long before your time for action comes. Dahlias will soon claim your attention. They must have plenty of attention, too. Personally I am not good friends with dahlias. They are the pompous purse-proud citizens of the flower garden, with a certain "Behold me" air which is a little exasperating. But they have a formal beauty all their own. You must give them well-drained, well-manured soil, for your dahlia, if he cannot live on the fat of the land, simply euchres you by declining to live at all. If you have had any very good varieties during the past year, and have put the tubers of these away, you can now take them out and lay them in boxes with some earth; then put them in a glass frame, or, if you have not this, in a

warm corner; and when the shoots begin to come, take these off and strike them under glass, if possible by the aid of bottom heat engendered by a heap of manure. The young plants thus obtained may first be potted up into small pots, and then planted out into land previously prepared for them. Rose cuttings may still be put in, as may cuttings of all shrubby and hardwooded plants. Cuttings of all half-hardy and semi-shrubby plants like fuchsias, heliotrope, &c., &c., can also be put in. Have a special propagating border for all these. Let it not be shaded by trees. This is fatal. If you can rig an arrangement to enable you to stretch a piece of calico over your cuttings to shade them at first and to check evaporation, all the better. Do not, however, keep them shaded at all times, but only in strong sunlight, otherwise they will grow lanky, and healthy plants will never result. All our roses here have been pruned. I am not pruning heavily this year. They were severely pruned last year to get them into better trim, and every encouragement is now being given to the production of flowers. Manure is being dug into the beds. The only pruning they have had this season has consisted in the removal of dead or exhausted wood. Annuals of the tender sorts, such as balsams, cockscombs, torrenias, and the like, may now be sown, also a smaller sowing of the more hardy annuals to follow any which may be removed early.

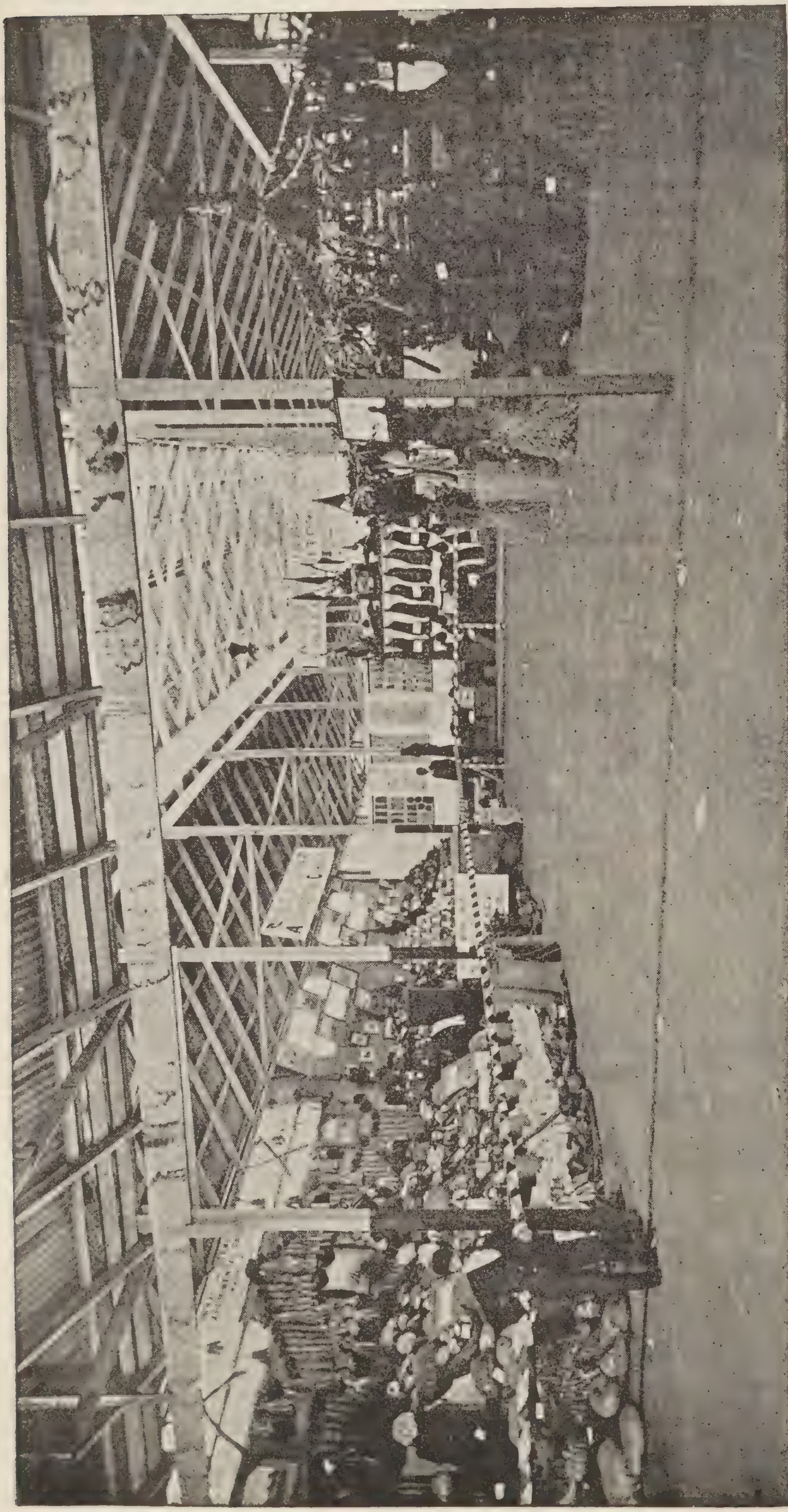
In the vegetable garden you may sow asparagus, artichoke, beets, cabbage, chicory, cucumbers, eschallots, lettuce, melons, onions, parsnips, parsley, potatoes, pumpkins, radish, rhubarb, squash, tomatoes, turnips, and vegetable marrows. Of course, in the case of the cold-weather vegetables smaller sowings will be made. The remarks about the preparation of land apply to the vegetable garden no less than to the flower garden.

Answers to Correspondents.

TICK FEVER.

A correspondent asks if there is any medicine which would be of service to cattle suffering from tick fever. His cattle have all been inoculated about ten months ago. Two of the inoculated animals died, as well as two which had not been treated, and one of the uninoculated cows recovered. He has been treating them with kerosene and fat, and with hide poison. On referring the question to the Chief Inspector of Stock, Mr. P. R. Gordon, that gentleman gives it as his opinion that no internal medicinal treatment will prove effectual. The only possible remedy is persistent smearing.

Plate XVIII.



General View of the Exhibits of the Queensland Agricultural College and Westbrook and Hermitage State Farms at Bowen Park.

Two Exhibitions of 1900.

If evidence were required of the great resources of Queensland and of the indomitable perseverance and energy of the colonists, that evidence has been furnished by the late exhibitions of the two principal Agricultural Societies of the Southern portion of the colony. The Royal Agricultural Society at Toowoomba, and the National Agricultural and Industrial Association at Brisbane, each furnished a spectacle of national wealth and industrial resources which cannot fail to leave its impress on the mind. When it is remembered that our fellow-colonists in the West have suffered severe losses in consequence of the unprecedented drought which has visited that portion of the colony, when we recall the dire losses of all classes of rural settlers from tick fever and tuberculosis, it must naturally occur to our minds that such national losses would be reflected by the South and East. Yet such an impression became completely dispelled on seeing the numerous exhibits of stock, both sheep, cattle, and horses, of grand agricultural and garden produce, of manufactured articles, of machinery, and of the thousand and one objects representing the life of the colony and the energy and resourcefulness of the inhabitants, which were presented at this year's shows of the two societies mentioned.

The committees of both have every reason to be proud of the unqualified success which they achieved, and, whilst it is generally held that there is always room for improvement in some way or another, we believe that it will tax the ingenuity of next year's committees to carry out the general arrangements in a more satisfactory manner than on the occasions under notice. It is the prerogative of the local journals to describe a metropolitan or a district show in detail. We, therefore, summarise the exhibitions by expressing what appeared to be the universal opinion of the thousands who visited the grounds day by day, which was—that the exhibits were very numerous and varied, of excellent quality, and had been arranged by the various stewards of sections in the manner best calculated to enable the public to examine them with comfort. We have also nothing to say but what is kind of the officials, from the presidents downwards, who laid themselves out to promote good feeling and harmony, and were in this eminently successful.

A few words on the character of the exhibits may not be out of place here. Brisbane and Toowoomba are cities which are not stationary. Their borders are yearly extending—their populations are steadily increasing. The Toowoomba of ten years ago is not the Toowoomba of to-day, nor is the city of to-day what it will be ten years hence. If there is one fault in the working of some of our colonial institutions, if not in all, it is that of not looking ahead. In the matter of exhibition buildings especially is this the case. Doubtless there have always been financial reasons for the apparent parsimony in this connection. But when money is plentiful, and a good balance is in hand, certain judicious expenditure by committees becomes a duty to their successors. We will consider the agricultural section first. Year by year an increased area of land is put under cultivation, and year by year that cultivation becomes more intense and the products more varied. Our towns are becoming surrounded by market gardeners, fruitgrowers, dairy farmers, horticulturists, and others, to whom it is of the greatest importance that the public in populated centres should become acquainted with the products they raise, and it is by means of these exhibitions that the desired end is attained. Now, when such exhibits are crowded into a small space, an unavoidable circumstance when exhibits are largely increased, and when the space allotted to them remains the same, it is impossible for judges to do entire justice to the exhibitors, and still more impossible for visitors to examine them in detail. How is more space to be obtained within a

building? Either by increasing the size of it, or by excluding certain exhibits which do not in any way represent a colonial industry. The main object of a show is to enable strangers and others to see what the colony produces, not to introduce, say, articles of wearing apparel made in foreign countries. Surely our fine shops are gorgeous enough as to their window display without transporting a large portion of them to the limited space of an Exhibition building, and visitors to a city find far more pleasure in studying the beautiful objects in a commodious shop, where they can see and also handle the goods, than in looking at them crowded up in a glass case at the Exhibition. If such exhibits were eliminated, much space would be gained at small expense.

Again, on the grounds outside the building, the agricultural and other machinery is usually far too crowded. It is often impossible to get to a particular implement without climbing over many others. The machinery, especially when in motion, and the agricultural implements are always an attractive portion of the grounds, and, therefore, it is only justice to exhibitors and the public that there should be plenty of room to move about in. Provision was made for this at the Toowoomba Show, to the great comfort of the visitors.

A large portion of the grounds is taken up by side shows, Aunt Sallys, &c., which might with much advantage be devoted to the exhibition of useful objects connected with the greater industries of the colony. Doubtless some form of amusement must be provided for the public and for the young folk, but it is possible to overdo this form of attraction in the anxiety to show a good balance-sheet.

One of the great features of our annual show ought to be what is known as district exhibits. On previous occasions the public took a very lively interest in the healthy rivalry between the Northern, Southern, and Western districts. This year only two districts competed—the Logan and the Lockyer. Both exhibits were most attractively arranged, and presented a very varied assortment of produce, manufactures, and minerals; but the climatic difference between the two districts not being so marked as would be the case had Cairns, Bowen, Mackay, Bundaberg, or any of our Northern producing districts entered the competition, the products exhibited by each did not present a great contrast. Southerners have rarely the opportunity of seeing the tropical products of the far North, yet how easily could arrangements be made for such exhibits at Bowen Park. In Queensland, unfortunately, there is no general organisation of the different Agricultural and Pastoral Societies. Each works for itself, holds its own show, and has no means of comparing its products on the spot with those of other districts. We would suggest that the National Association again take up the work, which it once began with fair success, of organising the district associations, and of enabling them to exhibit at the annual show at a minimum of expense to themselves. The fact of their appearance in Brisbane would not have the slightest damaging effect upon their own particular show. On the contrary, it is more probable that the district associations' hands would be very much strengthened by the increased spirit of emulation which would be the result of any successes obtained at the great Central Exhibition.

It was but natural that much interest should attach to the exhibits of the Agricultural College, since all the manufactured products of the dairy were the work of the students, who were enabled to prove the value of the establishment to the youth of the colony in a practical manner. The State Farm, "The Hermitage," Warwick, and the Westbrook State Farm, also amply justified their existence by a fine display of a most varied assortment of agricultural produce, each and all of distinct market value.

Taken as a whole, the two premier societies of the South have provided most excellent object lessons which cannot fail to leave an indelible impression on all who take an interest in agricultural development, and who have the welfare of the colony at heart.

Plate XIX.

Westbrook State Farm Exhibits at Bowen Park.

Plate XX.

The Hermitage State Farm Exhibits at Bowen Park.

Plate XXI.

Exhibits of the Queensland Agricultural College at Bowen Park Exhibition.

Agriculture.

STATE FARM EXHIBITS AT BOWEN PARK.

Only two of the State farms were represented at the Exhibition at Bowen Park last month. These were the Westbrook and the Hermitage farms, under the charge of Messrs. Quodling and Ross, respectively. Both these gentlemen had made the most of the space allotted to them, and set out a varied assortment of agricultural produce in a most attractive manner, the Hermitage stand being especially remarkable for the artistic manner in which the various exhibits were arranged. Amongst these might be noticed gigantic pumpkins, mangolds, swedes, carrots, many varieties of gourds, and long Turkish marrows. The wheats being a specialty of this farm, where the greatest attention is given to the selection and raising of the very best varieties, were very much in evidence, and the background formed by the wall of the building afforded an excellent means of exhibiting small sheaves of wheat, maize in the cob, and other products, which were not seen to such perfection in other sections. Both farms showed several fine varieties of potatoes, cauliflowers, cabbages, and other produce, as well as some well-made ensilage and numerous kinds of seeds. That most valuable forage plant, the saltbush, was shown to perfection amongst the Hermitage and Westbrook exhibits. There were two varieties, the *Atriplex nummularia* and *A. semibaccata*, growing in boxes. These we have already illustrated and described in a previous issue of the *Journal.* On looking at the dense bush-like growth of these specimens, one fails to understand why it is that people living in the dry Western country, where periodically every blade of grass vanishes from the face of the earth, do not reproduce this forage plant, which is indigenous to the soil, and accommodates itself to the sternest climatic conditions. If the only result of these State farm exhibits were to induce graziers to sow or plant saltbush, they will have done more in this than in anything else to benefit the community generally, and to prevent the serious losses which so often occur, particularly amongst the sheep.

Our illustrations will afford an excellent idea of the arrangement of the two exhibits.

QUEENSLAND AGRICULTURAL COLLEGE AT BOWEN PARK.

A visit to the portion of the Exhibition Building occupied by the Queensland Agricultural College exhibits could not fail to furnish a series of object lessons demonstrating the great value of an agricultural education, practical and theoretical, to those of our Queensland youth whose purpose is to enter upon farming and dairying pursuits. The object of the College is consequently to train these young men to scientific farming, to teach them the value of labour-saving implements, of fertilisers, of well-bred stock, and to inculcate carefulness, steady work, and economy in their work. It may be said that when a young man takes a farm he is not in a position to provide himself with all the expensive and up-to-date machinery which the Government places at the disposal of the students. Nor can he afford such expensive buildings, in the way of dairy, stabling, cowsheds, and piggeries; and that, therefore, the education he receives there is of no value to him when he begins to farm for himself. But this is not so. By means of the appliances at the College he learns the best methods of tillage, and the results are placed before him so clearly that he cannot fail to know the difference between good and bad farming, between bad and good implements, and, what is even more important, between inferior and high-class stock, whether horse, dairy cow, or pigs.

It does not at all follow that, because he cannot lay out money on steam-engines, expensive chaffcuttters and baggers, steam ploughs, &c., &c., he should not be able to command success as a farmer, even with a very modest outfit. He has learned high-class farming from the very beginning; he has learned a great deal about times and seasons for various work, about the varieties of plants and seeds; he has learned how to produce good ensilage, lucerne and oaten hay. Drainage he has also studied, and, in addition to pure farming, he has become an adept at pig and calf rearing, in cattle-feeding, butter, cheese, and bacon making. Furthermore, his mental education has not been forgotten; he has been taught mathematics, land surveying, a little chemistry, and botany, so far as he can apply these sciences to his future work. He leaves the College, in fact, with a thorough knowledge of farming, dairying, carpentering, blacksmithing, and, generally, with that sort of education which will carry him forward to success in the profession he has chosen. The results of the work of the students were very apparent at the Exhibition. We need not enumerate all the articles shown. Suffice it to say that the exhibits of the produce of the College market garden were hardly surpassed by those of the Hermitage State Farm, and the whole was produced by the students.

Cheese-making is one of the strong points of the College curriculum, and it was much in evidence, there being a pyramid of well-shaped, well-flavoured cheese shown, interspersed with potted cheese and neat tins of condensed, pasteurised, and concentrated milk—all, again, the work of the students, which work was again apparent in the appetising-looking sides of bacon, pigs cured whole, hams, and a host of other things—such as sweet ensilage, two years old, of an odour and flavour sufficient to tempt animals of a higher order than a dairy cow. A great number of fodder grasses, clovers, &c., were shown, and all were labelled for the benefit of visitors. Taken as a whole, the College exhibit was well worthy of a visit, and its success amply justified the trouble of exhibiting the work of the students. It is worthy of note that, during the whole time, the stand was in charge of one or two students, who most intelligently and obligingly gave whatever information was wanted by visitors.

A number of well-bred dairy stock was brought down for exhibition and sale, consisting mainly of young Jerseys. The College dairy herd has been well selected and culled, and purchasers can always depend on getting a well-bred animal. Several Berkshire and Tamworth pigs of all ages were exhibited and sold after the Exhibition.

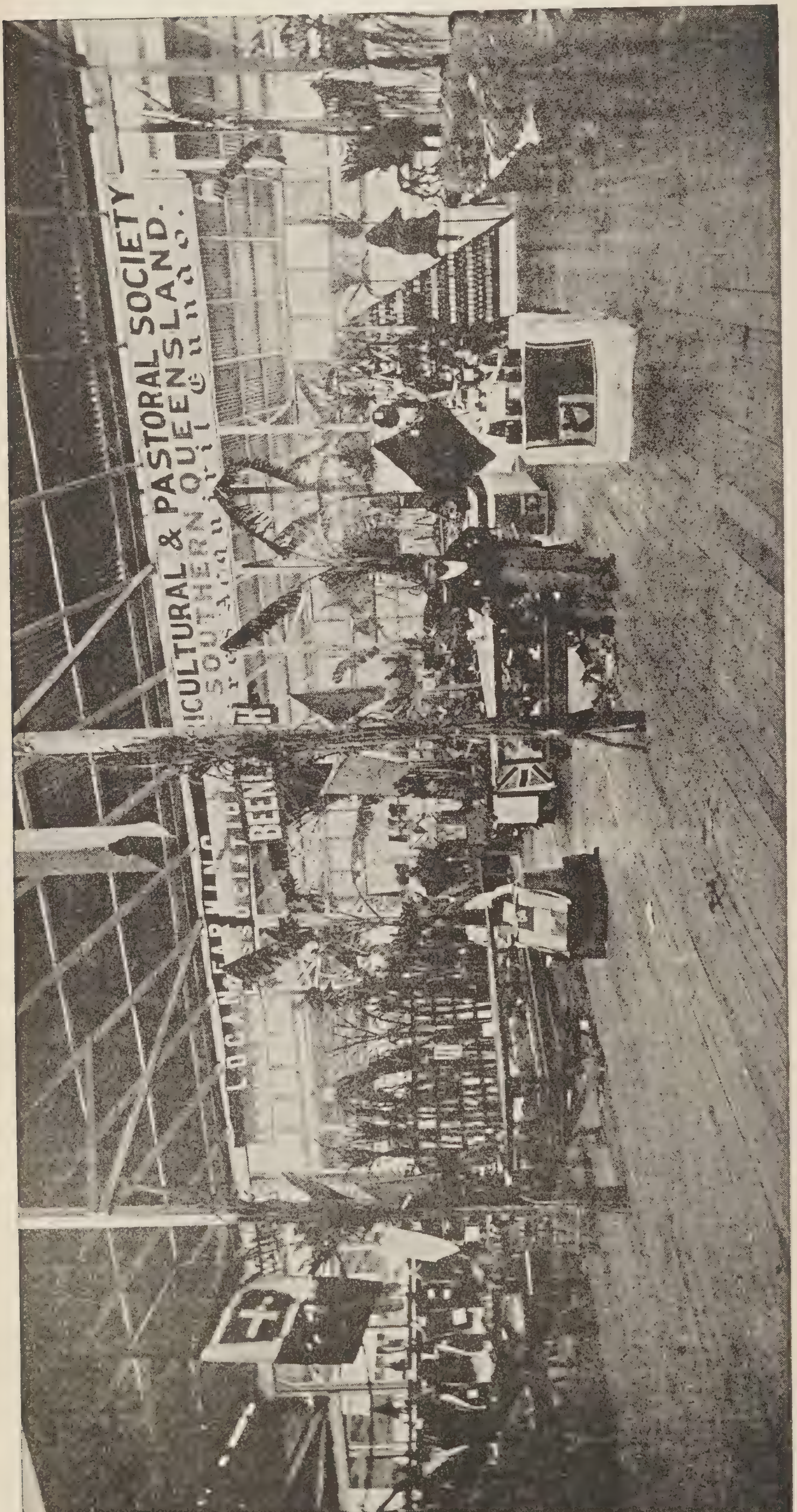
DISTRICT EXHIBITS AT BOWEN PARK.

Amongst the exhibits which excite the greatest interest at the Annual Metropolitan Show we may class those from the various Northern, Central, Western, and Southern divisions of the colony. At former exhibitions these have been very much in evidence—mainly through the interest taken in them by the Minister for Agriculture, who spared no pains to afford the societies exhibiting every facility for transport to the capital and return to the districts. For some unfathomable reason these most important sections of the Exhibition were this year limited to two—the Logan and the Lockyer. As we have said elsewhere, the climatic conditions of these localities are comparatively so similar that the exhibits varied little in the class of productions, whatever might have been the difference in quantity, quality, and arrangements. The two societies represented were equally fortunate in their representatives, and the gentlemen who took upon themselves the onerous duty of displaying to the best advantage the multifarious products entrusted to them, vied with each other in making the best of their opportunities. So well was their work done, that we confess to having been unable to decide between their respective merits. But we were not the official judge. Messrs. McLean, Benson, and Voller had a difficult task before them, and after much searching examination they arrived at the conclusion that the Logan exhibit was better than that of the Lockyer, but only by 12 points; and although we have no official warrant for saying so, we

Plate XXII.

Bacon and Hams made by Students of the Queensland Agricultural College.

Plate XXIII.



The Logan District Exhibit at Bowen Park.

believe that the question of a "food" *versus* a "manufactured" article had much to do with the decision.

Why there was no competition by Warwick, a veteran prizetaker, we could not learn, although it was said incidentally that "it was too much trouble."

If that were a correct statement, we are much surprised, for of all the energetic, painstaking secretaries of societies there is none more energetic than the secretary of the Eastern Downs Horticultural and Agricultural Association. However, the fact remains that only two societies competed for the district prize, and their respective secretaries worked hard to carry it off.

We cannot improve upon the report on these two district exhibits as given in the *Brisbane Courier*, and we therefore append it in full:—

DISTRICT SOCIETIES' COLLECTIONS.

One of the most interesting features of the show is the collection of exhibits of the districts embraced by the Logan Farming and Industrial Association, with headquarters at Beenleigh, and the Lockyer Agricultural and Industrial Society, with headquarters at Laidley. These two districts entered into competition for special prize given by the National Agricultural and Industrial Association of Queensland. The first prize of £50 was awarded to the Logan district, and the second of £35 to the Lockyer. A third prize of £25 and a fourth of £20 will not be awarded, as only two districts competed.

The display of agricultural, horticultural, and cereal products was unique, affording ample testimony of the producing power of two districts within a comparatively short radius of the capital city of the colony. The products were of infinite variety, comprising almost every known vegetable and fruit in season; while indigenous timber, both in the raw state and manufactured into butter boxes, staves, wheels, &c., exemplified that considerable wealth awaits development in the timber industry. Although the Lockyer exhibits were of a first-class character, it was obvious that the Logan had the advantage in comprising several manufacturing centres, which contributed in a marked degree to the comprehensiveness of its show. There is a friendly rivalry among district trophy exhibitors, which strengthens emulation, ultimately leading to greater effort at every state of progress; but it is manifest that some districts, owing to their environment and location, must for the time being be handicapped to a considerable extent. It is in this that the difficulty lies in providing for competition in specified exhibits. To obtain a fair idea of the producing power of a district, it is right to include all its potentialities, and, as some localities are by nature better adapted for raising products of the soil, they must in consequence hold the ascendancy in these competitions. Again, it is frequently noticeable that the inhabitants of certain districts possess greater ability than others, perhaps in more favoured places; and if it be possible to arouse the somnolent tiller of the soil to enthusiasm by the example of his brother cultivators, then the element of competition has done good work.

THE LOGAN DISTRICT.

To give a detailed account of the various products comprised in the aggregate exhibit of the Logan district would be a task of no little magnitude; but we will endeavour to summarise sufficiently to afford some idea of the display. It was early apparent that the Logan society has an energetic and painstaking representative in the secretary, Mr. F. W. Peek, and the success and progress of the society is due in a great measure to his efforts. The samples of rice, comprising the Japan, China, and White Java, bespoke progress in the important industry of rice-growing. Mr. Peek states that attention is being turned to it generally throughout the district. When federation is accomplished they expect the rice industry to develop large proportions. The rice was shown in various stages, from the grain in the husk to the marketable article, the latter being treated at the Pimpama Island mill. The White Java is the kind raised, as it is better adapted for dry land, and does not require flooding. Continuing our inspection, we perceive the tea plant, grown at Mount Cotton, and coffee from Redland Bay. Arrowroot, both in the raw

state and manufactured ready for market, cornflour and starch, treated at Messrs. Lahey and Sons' mills, Pimpama, are not the least interesting exhibits; while a sugar-cane stool containing forty-five canes, from Mr. Heck's plantation, was evidence of the adaptability of that part of the country for sugar-growing. The other twelve varieties of sugar-cane from Mount Cotton, Wolfdene, Pimpama Island, Alberton, and Eagleby were excellent specimens. The many varieties of the sorghum family were fully represented, giving an example of the response this valuable fodder makes to cultivation in the district. Lucerne, oats, and wheat point to the fact that the locality and climate are not uncongenial to their growth. An interesting exhibit is the chicory grown by Mr. M. Bloom, of Redland Bay, and treated at the mills of Mr. S. Grimes, M.L.A., Coomera. Dried rosella, for jam-making, was an evidence that although only dried in the sun, it can be preserved for a considerable time, that shown being dried two years ago. Preserved fruits and candied pineapples were shown in great variety. Farmers' bacon and hams were well cured. The Mild Cure Bacon Company, being within the Logan electorate, also contributed to the district exhibit. The Logan district, having a foreshore to Moreton Bay, and also having Garden Island and Rocky Point within its confines, was enabled to make a display of oysters and smoked fish as food exhibits. There were fifty-four varieties of timber, including silky oak, spotted gum, indiarubber wood, and many other kinds of local woods. A bottle of rubber-juice was shown; and as the tree abounds in the scrubs throughout the district, a new industry therein awaits developing. A novel exhibit was a hat made from the corn husk—a very ingenious bit of work. Polished bullock horns showed much skill and taste in preparation, while dressed skins of wild animals showed that Nature in her wildest mood yet contributed to Logan wants. A novelty was shown in a striped dingo skin, resembling a zebra. It is doubtful if another of the kind has been seen before. Brooms manufactured from millet are shown beside the raw material. Beenleigh rum and citrus vinegar created some interest. The vinegar is made simply from the orange juice, and a very good, palatable vinegar it is. Wines, West Indian yams, locally grown mangel-wurzel, table swede turnips, bottle gourd or Indian calabash, and a varied collection of numerous tropical and sub-tropical fruits, ginger weighing half-a-pound to a single root, and peanuts grown in the district, make up as comprehensive a display as could be seen anywhere. In fact, it is doubtful if any other part of Australia could produce such a varied collection of products. Queensland stands unique in regard to climatic advantages, whereby tillers of the soil are enabled to grow, either in one part or another, every known product.

THE LOCKYER EXHIBITS.

The representatives of the Lockyer exhibits contend that in some instances the raw material grown in their district is taken elsewhere, manufactured, and shown in competition against the district exhibits. Probably such has been done; but, as before pointed out, such a contingency under present arrangements is unavoidable. It is singular, however, that the Lockyer at the last and the present Exhibition obtained in the aggregate a higher number of points for manufactures than the Logan. Last year the Lockyer obtained 9 points for that section, and 7 this year; while the Logan obtained 7 points last year and 8 this. The Lockyer seems to have retrograded in the dairy exhibits this year, as it only obtained about half the number of points gained last year, while it has improved in grains. Notwithstanding the victory of its successful rival district, the Lockyer display was in every way worthy of commendation as showing the resources of a great and prosperous agricultural district. Mr. J. Fielding, the secretary of this society, is another of those energetic officials devoted to the interests of the district and of the society.

The Lockyer is yet without a rival for hay and chaff, and some of its exhibits in this class are well worthy of its high reputation. A trophy shown by J. McCartney, of Forest Hill, near Laidley, consisting of a number of neatly pressed bales of lucerne and oaten hay, very neatly arranged, elicited the approval of a large number of visitors, who gathered round to closely examine

Plate XXIV.

Trophy of Pressed Hay in the Lockyer District Exhibit at Bowen Park.

it. Maize is also produced in large quantity in the district, the quality of the grain being fully exemplified by the varied assortment on view at the exhibition. It would be difficult to find better maize than seen here. Mangel-wurzel seems to do remarkably well in the district, some of these roots attaining extraordinary size. As mangel-wurzel is among the most valuable fodder for milking cows, it is being grown to some extent in the district. Sweet potatoes are the small farmers' favourite crop. They are grown extensively by the German farmers in the Lockyer district for fattening pigs. The stalks, being of a milky nature, are found to be excellent food for milking cows. With this crop, milking cows, and pig-raising, the farmers have a profitable source of revenue. The potatoes were of astonishing dimensions—in fact, they resembled small pumpkins.

On the Lake Clarendon Estate, one of the properties repurchased by the Government, a number of agriculturists have already begun to show that the soil is well adapted for cultivation. The products of all kinds from there, embodied in the exhibits of the Lockyer, show extraordinary growth. The land is nearly all taken up by *bonâ fide* farmers, whose work will in the near future add considerably to the display of agricultural products from the district. The timber exhibits are very interesting. Silky oak, a wood resembling English beech, brigalow, cedar, rosewood, and the nut-tree formed a collection of valuable woods. A large trade is being done in timber in the Laidley district, the principal scene of operations being at Mount Mistake. Several mineral specimens are shown, including coal, copper, and galena. The coal, which appears of good quality, was obtained from three seams which run across Laidley Creek. It seems strange that no effort has been made to develop it.

The housewives of the Lockyer show skill in preserving all kinds of fruits and pickles. Notable among these exhibits are those of Mrs. Smith, of Gatton; Mrs. C. Burgess, of Laidley; and Mrs. O'Neill, of Thornton. Mr. F. Chambers, of Laidley, has a grand exhibit of honey, packed in handy sized tins, and nicely labelled. The honeycomb in miniature frames is also a good exhibit, showing that the district is well to the fore in apiculture. Mr. F. Drew has on view some splendid farmers' hams and bacon, and Mr. H. Daniel shows some excellent spiced beef. Specimens of building stone from the quarries at Helidon and Murphy's Creek—where the building stone for the new Central Railway Station is being obtained—exhibits showing the mechanical industries of the district, and locally made soap and candles, comprehend, together with the agricultural products, a useful reflex of the industrial capacity of the district. The work done by the pupils of the Laidley South State School is well worthy of mention, the excellence of the work in fancy and plain needlework, and in writing and drawing, being particularly noticeable.

THE AWARD.

The following table illustrates the number of points obtained by the two competing districts (Logan and Lockyer) at the Exhibition last year and this year:—

Exhibits.	Lockyer. 1899.	Lockyer. 1900.	Logan. 1899.	Logan. 1900.
Dairy produce	9	4	6	8
Preserved foods	9	3	6	9
Fruits, vegetables, and roots ...	7	7	8	9
Grains	5	7	2	5
Manufactures	9	7	7	8
Minerals and woods	6	6	3	3
School exhibits	2	4	5	4
Sugar	0	0	6	6
Wine, &c.	2	3	4	4
Tobacco	0	0	0	0
Wool	2	4	2	6
Hay and chaff	6	9	3	4
Total	57	54	52	66

STOCK EXHIBITS AT BOWEN PARK.

Our illustrations show some of the prizewinners in the horse and cattle section at the late Exhibition at Bowen Bark. There was not a very large number of exhibits in either section, if we except the fat cattle, which certainly were the finest lot all round we have ever seen exhibited. Amongst the heavy draught horses, Touch-me-not, owned by Mr. John J. Griffiths, of Rosewood, won the favour of the judges, as did Bowman, a splendid light farm horse, of the Suffolk Punch breed, owned by Dr. J. H. Cecil Roberts, of Gowrie.

Messrs. Paten Bros.' champion Ayrshire bull Leander, Mr. Alfred Gorrie's champion Jersey bull Milklad, and the young Hereford bull Duke of Connaught, exhibited by the Durundur Estate Company, were deservedly awarded first honours. Amongst the dairy cows, the champion Ayrshire cow Queen, the property of Mr. John Stewart, junr., was greatly admired, as was also Mr. Geo. Kibble's champion Jersey cow Zenobia.

We regret that we are unable to give an illustration of the horses and troopers in marching order of the Queensland Mounted Infantry, which were awarded first and second prizes amongst a dozen competitors. The first prize went to Private G. L. Dunlop, of "B" Company, Q.M.I., and the second to Private Dacey, who rode Sultan, a chestnut gelding belonging to Mr. Ernest Holmes. For details of the stock exhibits, we refer our readers to the metropolitan journals.

STALLION FOR THE QUEENSLAND AGRICULTURAL COLLEGE.

The following is the pedigree of the fine heavy draught stallion, Black Watch, lately purchased by the Department of Agriculture for the Agricultural College, Gatton:—

BLACK WATCH.

Bay colt, two years and six months old.

Sire—Scotchman.

Dam—Blossom, by Gleniffer, by Rowan's Scotchman (imp.); his dam by Blackleg (imp.). Blossom's dam, by Rob Roy, by Cromwell (imp.); his dam, by Brilliant (imp.); g d by Emperor (imp.); g g d by Champion of Scotland.

Black Watch, of whom we give an illustration, gained first prize for two-year-old draught stallions at the show of the Royal Agricultural Society of New South Wales in April last.

QUEENSLAND SETTLERS AND FARMERS' HOMES.

PART II.

BY FRED. W. PEEK.

We will suppose, for the purposes of this article, that you have made up your mind as to which branch of agriculture you have decided to follow, and that you have paid a visit to the Lands office in the first place to find what lands are available or open to selection, or perhaps you have been offered a piece of land privately for sale, by a previous purchaser from the Crown. The first step should be to gain the fullest information as to the suitability of the land—its geographical and climatic conditions—to ensure a likelihood of success in your future operations, for, although you may flatter yourself that you have a certain amount of knowledge of such things, still, information of both a practical and official nature can be readily obtained from the Agricultural Department upon which you can with safety rely. I have known many instances where intending settlers and farmers would have taken up land (which in their hands would have led to certain success), only they have been deterred

Plate XXV.

TOUCH-ME-NOT, Owned by J. J. Griffiths, Esq

Suffolk Punch BOWMAN, Owned by [redacted] J. H. Cecil Roberts, Esq.

Plate XXVI.

Champion Ayrshire Bull LEANDER, Owned by Messrs. Paten Bros.

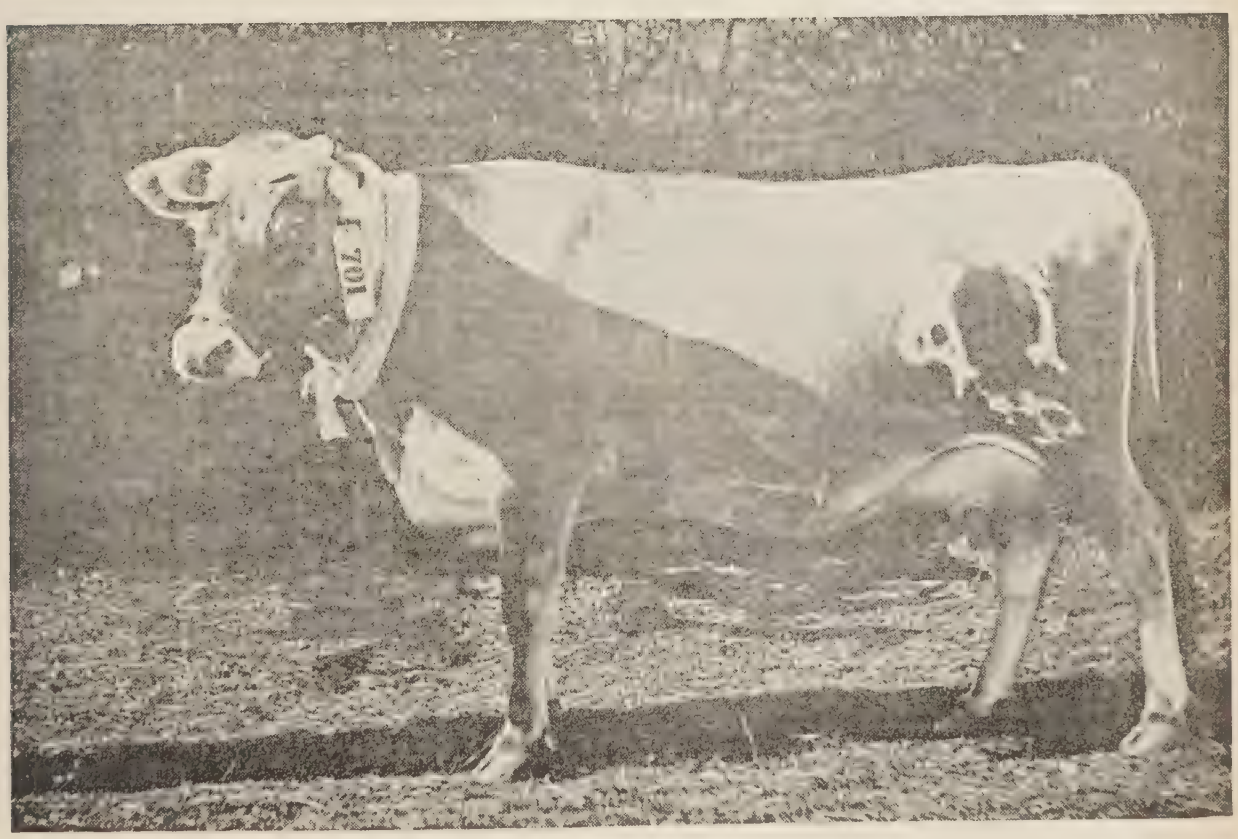
Champion Ayrshire Cow QUEEN, Owned by John Stewart, junr., Esq.

Plate XXVII.

Champion Hereford Bull DUKE OF CONNAUGHT, Owned by the Durundur Estates Co.

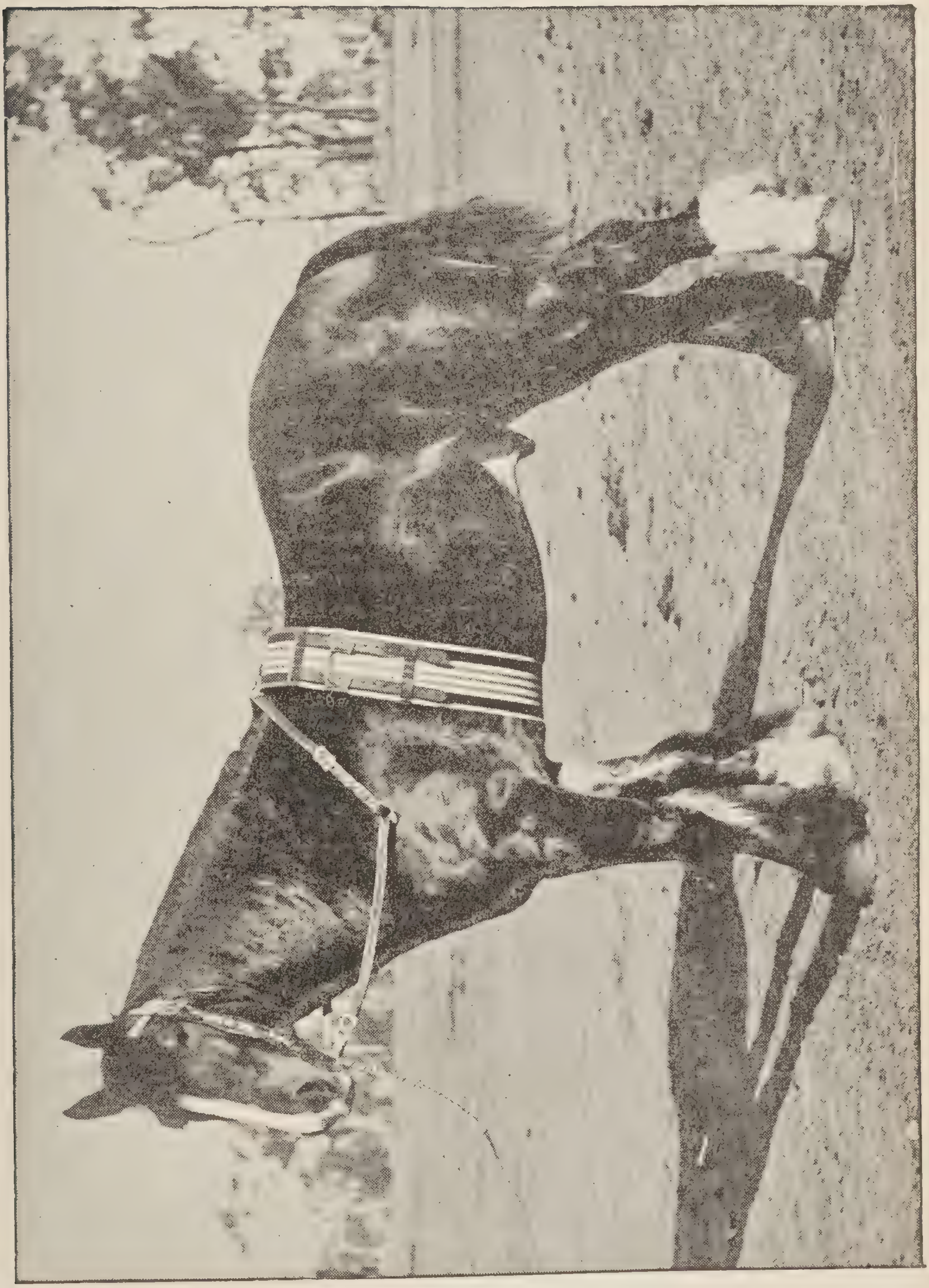
Plate XXVIII.

Champion Jersey Bull MILKLAD, Owned by A. Gorrie, Esq.



Champion Jersey Cow ZENOBIA, Owned by Geo. Kibble, Esq.

Plate XXIX.



Heavy Draught Stallion BLACK WATCH, from the Queensland Agricultural College.

Plate XXX.

Jersey Bull CHIEFTAIN 8th

from doing so owing to bad advice given by ignorant and inexperienced persons as to the qualities of the soil and its capabilities; therefore I advise all those intending to start farming to obtain the fullest information from the Department of Agriculture and its officers, who are always most happy to assist as far as possible, and who can supply statistics and returns of the very latest productions of each district.

Having selected the district and the land, the first thing is the erection of a house, or rather the selection of a site for the house, and here a little thought and judgment are necessary. Go carefully over the ground, picking if possible a slight elevation, or, if the land is ridgy, try to place the house in such a position that the outlook will command a view of the cultivation, paddocks, &c. It is astonishing what a pleasant feeling it is to a farmer to know that by simply walking to the door or, on to the veranda that he can there satisfy himself that things are all right; the barns, sheds, stables, stockyard, &c., are also the better for being elevated, as it is then an easy matter to drain and keep the yards clean—an essential to good farming, and especially so in dairying. I need not here dilate on the kind of buildings necessary to be erected, whether of split slabs, sawn wood, or iron. This is more a question of the means at the command of the settlers. If there is a sawmill in the neighbourhood it will be found that most proprietors of mills will be willing to exchange sawn timber for logs, so that if you are handy with a few carpenters' tools the cost of buildings to suit your requirements is reduced to a minimum. One thing I would advise and that is—whatever buildings you erect let them be strong and substantial. "Good enough for the present" or "They will last my time" is a saying we often hear, and much inconvenience is caused to our farmers and their families by makeshifts, when the comfort and enjoyment of farm life at home would be increased if better attention were given to the buildings and outside conveniences, such as stabling, sheds, barns, &c. The right motto in farmers' homes, as everywhere else, is "A place for everything and everything in its place." I shall treat further on this subject later on, when I am dealing with accessories to farm homes.

The Kitchen or Market Garden.—I have now dealt with the selection of the site and the buildings, and with the particular branch of the agricultural industry intended to be followed by those taking up land on which to create a home for themselves and their families; and in dealing with the kitchen or market garden, a word of advice to the beginner may not be out of season here. In the first place it is not often that much freedom of choice is allowed with respect to the situation. If land is obtained near towns, it is frequently too dear or too limited for a choice in the selection of one spot rather than another. In the greater number of cases, there is the house already erected, where, of course, it must stand, and there is the garden, where the previous owner has attempted to make it, and the position has either to be accepted, or trouble and expense are caused in alterations. But in taking up new land the conditions are different, and our choice may not be so limited as to the question of site. And since gardening is a science, enthusiasm is a necessary qualification for the industry. The individual who likes to take his ease will find that in this, as in other branches of agriculture, he will have to contend with various obstacles at first, but if he only possesses plenty of energy he will attain success, even though he may possess but a little rudimentary knowledge of gardening at the outset. Fortunately land for gardening purposes can be treated in a more efficient manner, owing to its smaller area, to secure large returns for the labour and care bestowed, than several acres comprising the farm proper. Much can be done to improve the soil for a garden for kitchen and market purposes by what is now termed "intense culture." Soils can be removed to a certain depth, intermingled, and greatly altered by drainage, raising of levels, &c., to suit existing circumstances, and such work will have a marked and beneficial effect on future operations, enabling the garden to produce crops of vegetables and fruits, where previously the land in its original state scarcely grew sufficient grass to feed or maintain a cow. An object lesson on cultivation, manuring, and cropping can be (perhaps unwillingly) taken from

"John Chinaman," who has taken up and, to a great extent, has monopolised the market garden industry in Brisbane and other large towns. The garden to them is almost a matter of life and death. They load the land with such an abundance of manure that in a very short time the most barren and sterile soil is brought into a highly productive state.

I think, then, this will go to prove that it is not necessary to have the pick of the farm and our richest piece of land for gardening purposes. It is more on the treatment of the soil that success depends, and those about to enter into gardening operations will do well to remember these facts and principles. I have known farmers in this colony who have begrudged manure for the garden for fear they would be robbing their farm, and I have even known farmers sell the manure from the stables, fowlhouse, and stockyards for a few shillings, whilst a peep into their garden would show lettuce running to seed before its time because the soil is poor, and cabbages doing the same or forming hearts the size of an orange, the peas looking sickly and bearing little, shrivelled pods not worth picking, and the peaches and other fruit trees dying or turning yellow in the leaf, and the fruit dropping off diseased and immature for want of the necessary nutriment to sustain them in health and vigour.

In the laying out of a kitchen—or market—garden, an endeavour should be made to have it as near the residence as possible, both for pleasure and for economy, keeping in view the main object, which is to obtain the greatest amount of produce possible from the land set apart for such purposes; and in this colony (which has proved most favourable to gardening operations), if only an adequate water supply be obtainable, the land need never remain idle. The sooner one crop can be replaced by another, and the less time that is lost in getting the land into good tilth, the larger will be the returns at the end of the year, both in produce and also financially. On the matter of laying out the grounds, paths, borders, &c., it is necessary, of course, that a fence should be erected first, and if there is plenty of timber on the property posts and rails and palings can be easily procured; but if timber cannot be obtained easily, it will be found that marsupial mesh wire, fastened to posts and rails, acts splendidly, and the Department of Agriculture assists grazing farmers to procure it on easy terms in marsupial infested districts. Should the site selected for the garden be on a gentle slope (an easterly or south-easterly aspect would be the best so as to get the benefit of the early morning sunshine, which is of great assistance in getting early crops), the first business of vital importance to gardening—drainage—will not be so difficult to manage, the accepted theory of "drainage" being the art of laying land dry, but this is not the true explanation of its practical results, because, although it may appear paradoxical, drainage is as useful in keeping land moist as in laying it dry, its proper function being to maintain the soil in the best possible condition for the development of plant life, by altering the texture of and ærating the soil and increasing the temperature, which is accomplished by removing unhealthy exhalations, and superfluous water drainage also facilitates the decomposition and absorption of liquid and solid manures, and, as has already been published in this *Journal* by others, all rain water contains more or less of what is termed carbonic acid and ammonia; therefore, it stands to reason that the larger the quantity of water that passes through the soil the greater will be the amount of these elements brought into contact with the roots of plants; not only this, but where land is of a wet, clayey, or heavy nature, solid manures, even of the richest quality, are comparatively useless without a thorough system of drainage. Therefore, it can be easily understood that judicious drainage is most necessary to the better results of gardening operations. It would be superfluous on my part to dilate on drainage systems—whether they should be open drains at intervals, or at certain distances apart leading to a principal drain, or whether pipe or covered drains would be the best. That is a matter to be judged and decided upon when fixing the site and laying out the grounds. A careful perusal of the practical instructions and methods laid down by previous writers in pp. 64, part 1, vol. I., and pp. 12, part 1, vol. II., which will greatly assist our coming gardener, farmer, and settler in this most important part of his industay.

To explain a little clearer the various kinds of drains I give here a few diagrams, showing sections of some that can be easily constructed from bush materials, with the exception of Fig. 1, the pipes for which, of course, have to be bought:—

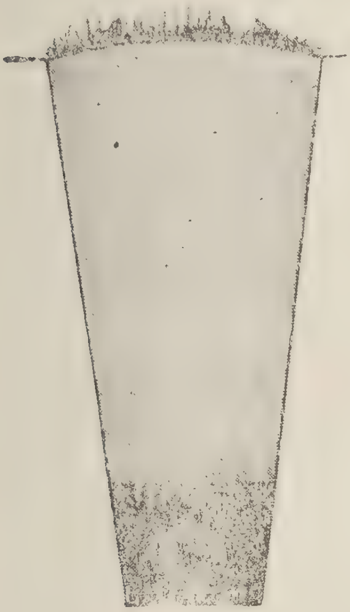


Fig. 1.

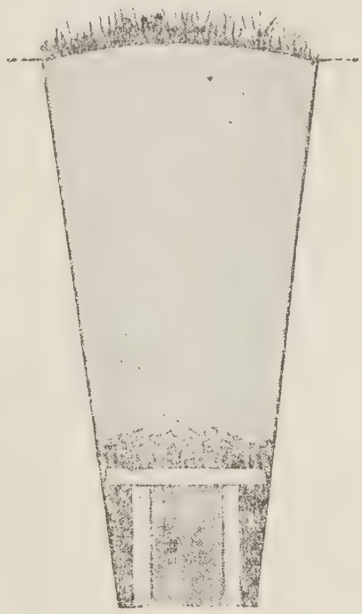


Fig. 2.

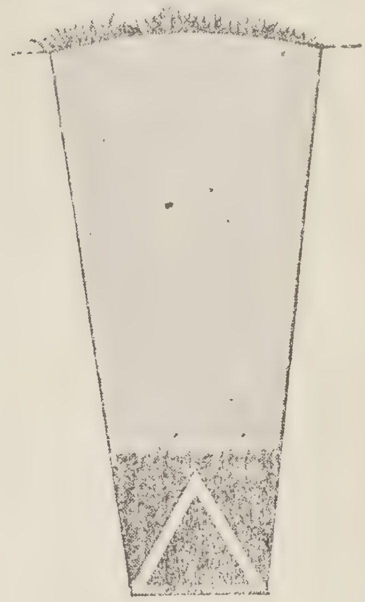


Fig. 3.

Fig. 1.—Ordinary pipe drain. Fig 2.—Square slab drain, made by placing two slabs on edge, and one of top. Fig. 3.—Triangle slab drain, made by placing two slabs at an angle of 45 degrees.

It is advisable that the slabs be in short lengths, and well fitted.

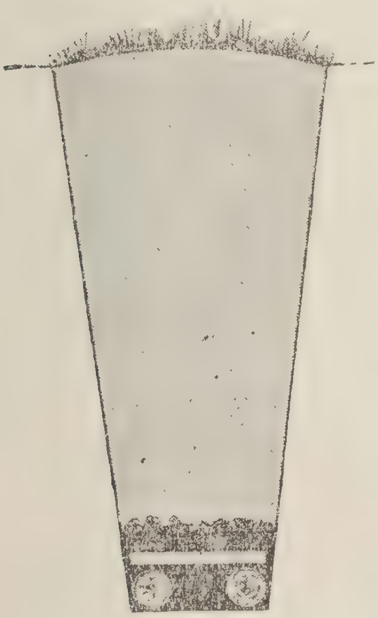


Fig. 4.

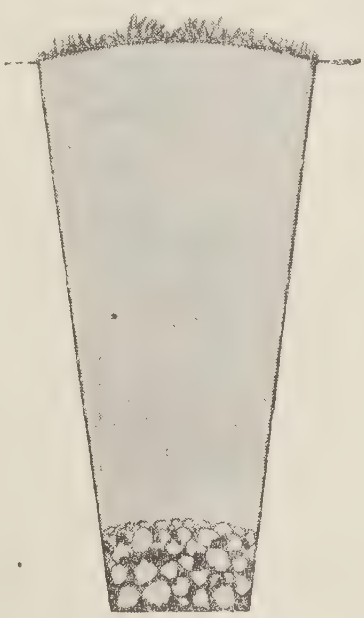


Fig. 5.

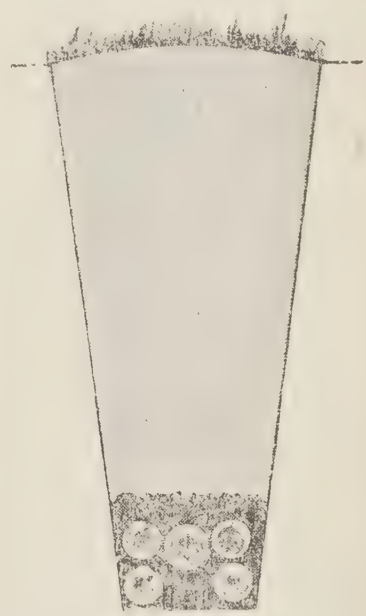


Fig. 6.

Fig. 4.—Slab and sapling drain, made by placing a couple of saplings at the bottom, and a slab on top of them. Fig. 5.—Stone drain, made by filling in with about 1 foot of large stones at the bottom, and smaller stone, brushwood, or turf on top. Fig. 6.—This drain is composed wholly of saplings. It will be found that ti-tree answers admirably with brushwood or turf on top.

In all cases it is desirable, whether pipe, slabs, or saplings are used, to see that the bottom is well levelled, and the materials well packed, to keep it from shifting, otherwise the consequence will be a silting up of the drain, thus rendering it useless, as it will not act. The average depth for farm or garden purposes would be from 3 feet to 3 feet 6 inches, and for orchard purposes 5 feet is not too deep.

I would like to add in this article a little upon the subject of terracing—that is, where, as in some cases, it is found unavoidably necessary to form the

garden on a steep slope, in very ridgy or mountainous country, and where ordinary methods could not be advantageously availed of. In such cases it will be found by making terraces—that is, removing a portion of the soil from the higher side of the hill to the lower, forming a series of steps running horizontally across the elevation of the land—a better result will be obtained than by following the slope or natural formation of the land, preventing, as in some cases, the washing away of the soil by the heavy tropical rains, and consequent loss of plants, fertilisers, and manures. By slightly terracing the hill and constructing a catch drain on the higher side of the slope, the water can be led to a main drain, which could be made to empty into a reservoir for watering the garden in dry times. In breaking up the land I would recommend deep working, say from 12 to 18 inches. This can be done with a subsoil plough in some cases; in others, where the plough is not available, the breaking up must be done by hand with the spade and ordinary garden tools, but this will be found very costly if the garden is of any size. After the land is thoroughly broken up, the next thing is the formation of your seed beds, the marking out for the fruit trees, and of the portions to be devoted to special crops it is intended to raise. Special crops mean special treatment of the soil for their successful culture, but in all cases I would recommend planting in straight rows, with sufficient space for working with a horse if on a large scale, and with a hand cultivator if on a small scale. The ground will be thus easier kept clean. The main secret of successful cultivation lies in keeping the surface loose, especially round the growing plants. Never let the surface harden, which it will do after heavy rainfall, but, directly it is possible to do so, get the cultivator to work and loosen the soil. In cropping a garden, it is a very good plan to keep a memorandum book, in which to record the operations and have something to refer to for future reference. Few gardeners or farmers will take the trouble to make such entries, but they will find if such a record of work was regularly kept, they would be saved a deal of inconvenience and annoyance by forgetting when certain seeds were sown, and whether they have planted old seed which has failed to germinate. They are afraid to dig over the bed and plant fresh seed for fear they might destroy it, just as it was going to make a start, thus causing a delay, which a more up-to-date neighbour has avoided by purchasing his seeds from a reliable seedsman, and by keeping a record of his daily work; but, in any case, it is advisable to put a ticket or piece of cardboard on the seed bed, thus:—

COS LETTUCE. SOWN—25TH JUNE.	EXPRESS CABBAGE. SOWN—2ND MARCH. *Planted out—15th May.*

The cardboard can be stuck into the end of a slit cut in a bit of wood 6 or 8 inches long, the other end pointed to go into the ground; thus you will have a concise record of each crop. There is an important reason why each crop grown on each strip, or row, should be carefully remembered—that is, the great desirability of a rotation crop. It is now perfectly understood that all plants do not require the same nourishment or food, some extracting more than others of certain constituents in the soil, and it has been frequently pointed out that what one plant leaves may prove exactly suitable to another. Therefore, by following this system, better results must be obtained. The selection of what to plant can be left to the gardener's own judgment and requirements. The times and seasons at which to plant can be ascertained by reading the monthly garden operations, as published each month, or any seedsman from whom you purchase your seeds will present you with a catalogue containing all needful information, and if the principle of good cultivation be adhered to by keeping the soil loose, by good and perfect drainage, by manuring, and by judicious watering, and if attention be given to the crops, the farmer's kitchen and market garden need never be short of a supply of vegetables.

POTATO-GROWING EXPERIMENTS.

It is an interesting feature of present-day agriculture that so much attention is bestowed on the potato crop. Occasionally it is roundly abused as a crop which should be abandoned; it is a lottery in which the blanks vastly outnumber the prizes; and yet farmers continue to grow potatoes, and numerous experiments have in recent years been carried out to determine how this may be most profitably accomplished. Trials have been made not only to discover the best system of manuring, but also to find the best kinds to grow, the best way to plant, and the best way to harvest. At the Harris Institute, Preston, Mr. R. S. Seton continues the work begun by Professor Campbell, and in an interesting pamphlet recently issued he tells the story of the past season's experiments. The objects aimed at were very much the same, and the methods adopted for arriving at results were not dissimilar.

To begin with, the Preston experiments show that, giving 20 tons per acre of farmyard manure in place of 10 tons only, increases the yield to the extent of meeting the enhanced outlay, with perhaps a very little more. The addition of a complete manure in the form of 4 cwt. superphosphate, 1 cwt. sulphate of ammonia, and 1 cwt. sulphate of potash, to the 10 tons, yielded practically the same result. By omitting the sulphate of ammonia a decrease of 4½ cwt. per acre was caused, and similarly the omission of the super-phosphate gave a decrease of 1 cwt. per acre, whereas, by omitting the potash, there was actually a slight increase. Converting these results into cash nomenclature, the estimated increased profit per acre when potash was omitted, is 12s.; when superphosphate is omitted, 11s.; when a complete manure is applied along with the 10 tons dung, an increase of 1s. per acre results; and, when the nitrogen is omitted, the increase is only 9d. per acre. These comparisons are with the profit from the application of 10 tons farmyard manure alone. It will be remembered that one lesson taught by the Garforth experiments is that, while potash may be omitted from a potato manure when dung is applied, artificials alone are unprofitable unless a complete manure be used.

Much debate arises over the question: When ought nitrogen to be applied to the potato crop? Experienced men will be disposed to say that a good deal will depend on the season, and a subsidiary experiment at Preston bears this out. In 1899 the application of either nitrate of soda or sulphate of ammonia in the ridges at planting was by far the more profitable method of procedure. The profit from this mode of application was with nitrate of soda at the rate of 25s. per acre, and with sulphate of ammonia, 18s. 9d. per acre. Very likely in a season of a different nature opposite results would have been obtained, and he is a wise man who does not dogmatise where so much depends on the weather.

Several other little experiments were conducted by Mr. Seton. One dealt with the relative merits of sprouted and unsprouted sets for planting. The results in this case were favourable to the sprouted sets—to the extent of an increase in yield per acre of 1 ton 4 cwt. 0 qr. 12lb., with fewer small potatoes. Experience generally will confirm this view. A second query concerned the influence of lime in causing scab in potatoes. It is a very ancient theory that lime is the cause of scab, but if these experiments may be relied on, like a good many other theories and notions, this will have to go. In the trial, the potatoes which received no lime were scabbed as well as those which did, and scabbed seed was no more fruitful in yielding scabbed tubers than seed which was perfectly free from scab. Last of all, Mr. Seton and his coadjutors had a shy at the cooking test. The sort experimented on was Maincrops, and the aim was to find out which manurial dressing produced the best eating potato. Mrs. Arnoux, at the Preston School of Cookery, did the cooking, and declared the results. The best flavoured potatoes, cooked with or without jackets, were grown on 20 tons farmyard manure with no artificial dressing; the second best on a plot which got no manurial dressing whatever; and the third best on a plot which got 10 tons farmyard manure, supplemented by 4 cwt. superphosphates and 1 cwt. sulphate of potash.

GERMAN CO-OPERATIVE AGRICULTURAL BANKS.

The *Journal of the Board of Agriculture*, London, quoting a German agricultural paper, says—

A striking feature of the co-operative movement in the rural districts of Germany has been the rapid growth in the number of co-operative loan and credit associations, or agricultural banks. In 1890 these numbered only 1,729, but on February 1st, 1900, there were 9,428 banks of this character in operation in the Empire. Most of the agricultural banking associations are worked on the Raiffeisen system, and a few are organised upon what is known as the Schulze Delitzsch system, but these are not so popular as the former in the purely rural districts.

HOW MUCH SEED TO USE.

Last month we gave the quantities of seed of various crops required per acre broadcast or in drills. To this list we may add the quantities required per acre in hills :—

Maize, 8 to 10 quarts; cucumbers, 2 to 3 lb.; climbing beans, 8 to 10 quarts; rock-melons, 2 to 3 lb.; squash, 2 to 3 lb.; pumpkins, 2 to 3 lb.; water-melons, 4 to 5 lb.

The quantity of seed required to furnish a certain number of plants, approximately, and allowing for seeds which do not germinate, is—Asparagus, 1 oz. to 500 plants; cabbage, 1 oz. to 1,500 plants; cauliflower, 1 oz. to 1,000 plants; celery, 1 oz. to 2,000 plants; egg-plant, 1 oz. to 1,000 plants; endive, 1 oz. to 3,000 plants; leek, 1 oz. to 1,500 plants; lettuce, 1 oz. to 3,000 plants; pepper, 1 oz. to 1,000 plants; tomato, 1 oz. to 1,500 plants.

Quantity of seed required for a given number of hills—Maize, 1 quart to 200 hills; cucumber, 1 oz. to 125 hills; musk-melon, 1 oz. to 60 hills; climbing beans, Lima beans, 1 quart to 100 hills; climbing beans, wax, 1 quart to 150 hills; pumpkin, 1 oz. to 50 hills; squash, 1 oz. to 50 hills; water-melons, 1 oz. to 30 hills.

Quantity of seed required for a given length of drill—Asparagus, 1 oz. to 60 feet of drill; beets, 1 oz. to 50 feet of drill; beans, dwarf, 1 quart to 100 feet of drill; carrot, 1 oz. to 100 feet of drill; endive, 1 oz. to 100 feet of drill; okra, 2 oz. to 40 feet of drill; onion, 1 oz. to 100 feet of drill; onion sets, 1 quart to 50 feet of drill; parsley, 1 oz. to 125 feet of drill; parsnips, 1 oz. to 200 feet of drill; peas, 1 quart to 75 feet of drill; radish, 1 oz. to 100 feet of drill; salsify, 1 oz. to 70 feet of drill; spinach, 1 oz. to 100 feet of drill; turnips, 1 oz. to 150 feet of drill.

DANGER IN GREEN SORGHUM.

Science is up the stump. She can't find out why green sorghum should be so quickly fatal to cattle, says an exchange. Sorghum rapidly is coming into favour as a forage crop. Owing to the large yields obtainable and to its high feeding value, stockmen are beginning to depend upon this crop for fodder and roughage. But fatalities in herds pastured on the growing cane are frequently reported. With the increased use of this crop for forage there has followed an increase in the number of fatal cases. Cases are recorded of cattle dying within five minutes after entering a sorghum pasture. The true reason for this fatal effect is not known, but many stockmen believe it may be found in the

presence on the leaves of the cane of poisonous fungi. One Nebraska farmer was driving his cow across a small strip of cane, and before the animal had gone more than a few rods she dropped, and in a few minutes she was dead. Another cow that was killed by green sorghum had eaten only one stalk, apparently, and that was still in her throat. The Nebraska Agricultural Experiment Station has analysed stalks of green sorghum that, being partly eaten by cattle, had killed them. It found none of the common known vegetable poisons excepting a small quantity of oxalic acid that could not be fatal.—*Picayune.*

EFFECTS OF GREEN SORGHUM.

THE EFFECT OF SECOND GROWTH CANE.

The opinion seems to be widespread that it is the second growth only that is dangerous and exhibits this toxic effect, and that the first growth may be fed with impunity. Dr. Pritchard states that "the second growth of sorghum under certain conditions is very destructive to cattle, small quantities killing them almost instantly. Just what this destructive agent is I am not able to say." Individuals are doubtless justified in drawing such conclusions from the results of their own experiences, but if a number of cases be considered, it may be seen that this is not invariably the rule. In many of the letters received, mention is made of the fact that cattle have died from eating first growth cane, and, on the other hand, numerous instances have come under observation of cattle eating to their fill of second growth without being injured in the least. Such contradictory evidence as this proves nothing in regard to the poisonous qualities in general, but points to the fact simply that the first crop may not always be fed freely with safety, and that the second growth is not always injurious. It is probable that in most cases where fatalities have occurred from feeding the second crop that death was caused by bloat. In a wet season this second growth springs up quickly, affording a very tender, succulent pasturage. Cattle turned on to such a pasture are very liable to gorge themselves.

It must be admitted that in the majority of cases recorded it has been the second growth of sorghum that has proved fatal. Whether such fatalities are due to impaction or to some other cause, it is more than probable that the same results would have followed if the same cattle in a similar physical condition had been pastured on the first crop in a similar stage of development. It seems quite improbable that any poisonous principle is developed or stored up in the plant in any particular stage of its growth, and not in any other stage. If a poisonous constituent were not found in the first growth, it is probable that none would be present in the second growth, and *vice versâ*. This statement is in accord with what is known regarding the chemistry of all plants. A poisonous substance that is elaborated in a certain plant may always be found in that growing plant at any stage of its development. For example, in the loco weed is always found a poisonous acid that characterises the plant, or in the poison ivy the insidious virulent oil is always present. The same is true of the non-poisonous constituents of plant tissues; sugar is always found in the sugar beet, terpenes in the sage plant, &c. In other words, the chemical substances, toxic or non-toxic, found in any plant are characteristic of it, and in most cases are inherent and indispensable parts of the plant tissue.

In view of the common practice of cutting the first crop of sorghum for hay and pasturing the second crop, it is not difficult to understand the reason for the prevailing impression regarding the injurious effect of the second growth. It is very likely that if the unmatured first growth were fed as freely as is the second, the number of cattle affected would be more nearly the same in each case.

CONCLUSIONS.—It must be admitted that positive proof is still lacking regarding the cause of the disease occasionally induced by sorghum plants. Negative results of an analysis are usually not satisfactory, but in this case they are at least quite conclusive. In view of the analyses and of the collateral evidence given, it seems certain that the toxic effect of this plant which manifests itself at times is not due to a chemical poison inherent in the plant, and is not peculiar to the second growth alone. This last statement is of special importance. It is in direct contradiction to the prevailing popular opinion, but the facts at hand sustain the conclusion. The proof of this once accepted, and the prejudice against the second growth thereby removed, will result, it is believed, in a greatly increased use of this valuable forage crop. The greater the number of cases studied the more evident it becomes that this is a matter governed entirely by local conditions, and that the safety and health of the herd may be controlled to a large measure by the herder himself.—*Pacific Rural Press.*

THE JERUSALEM ARTICHOKE.

By HENRY A. TARDENT,
Manager of the Biggenden Experiment Farm.

Amongst the numerous products exhibited by this farm at the last Maryborough Show, none, perhaps, has attracted more attention and elicited more inquiries than a few tubers of the so-called Jerusalem artichoke.

The plant seems to be little known in this colony, and still less grown and used. It is, nevertheless, in many respects a valuable esculent for man, as well as a first-class feed for cattle, horses, sheep, and pigs.

Its exceptional drought-resisting nature should make it worth while for our Western friends to give it a trial on a small scale. I venture to think it will prove a good stand-by for both man and beast during the protracted droughts which occur periodically in that part of the colony.

The only thing somewhat remarkable about the plant is its English name; it is not by any means an *artichoke.* Neither is it, as some people have inferred from its religious name, one of the ten lost tribes of Israel stranded in Queensland. The name of "Jerusalem" is not even an indication that the plant originated in the Holy Land; it is simply what grammarians call a

Cynara scolymus.

corruption of the word *Girasole* (in French, *Tournesol*), which the Italians give to both the sunflower and the Jerusalem artichoke.

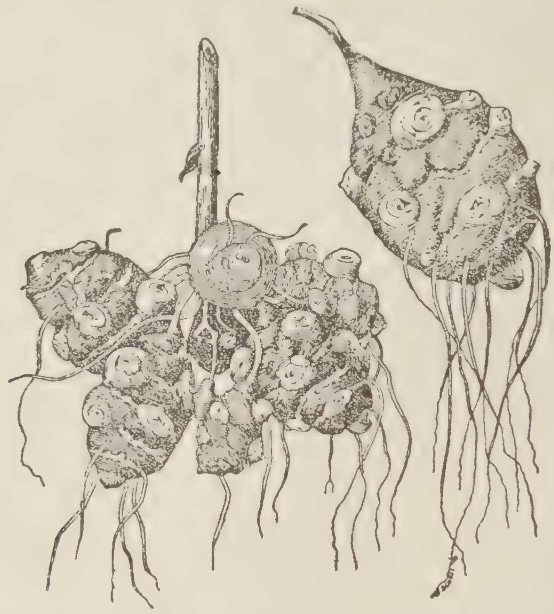
The true artichoke (*Cynara scolymus*) is a chard or thistle, of which the bottoms of the flowers (*fonds d'artichauts*) and the rib-like sepals are used as food.

The so-called Jerusalem artichoke (*Helianthus tuberosus*) belongs to a quite different branch of the Compositæ—the Senecionideæ. It originates from North America.

The stems, leaves, and flowers bear a great likeness to the sunflower of the same family, the principal difference residing in the flowers, which are much smaller. When green, the tops or stalks can be made use of as green fodder, hay, or ensilage. When dried, the stems are sometimes used as bean sticks, also as fuel for the oven.

Helianthus tuberosus.

But the main value of the plant lies in its tubers growing like potatoes in large numbers round the roots.



Those tubers, called, in French, *Topinambours*, form a very palatable food when fried in butter or boiled, or, still better, steamed. They never seem better, however, than when baked, bush fashion, in the hot ashes.

For animals their feeding, milk-producing, and fattening value is considerable.

According to analyses kindly supplied me by Mr. A. C. True, the director of the Experiment Station Office at Washington, the Jerusalem artichoke seems to compare favourably with such favourite crops as the English and sweet potatoes, turnips, mangel-wurzels, &c.

These are the figures taken from the Experiment Station's work, IV.:—

—	Water.	Protein.	Fat.	Nitrogen Free Extract.	Fibre.	Ash.	Potash.	Phosphoric Acid.	Nitrogen.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Jerusalem artichokes tubers	78·7	2·5	0·2	16·7	0·8	1·1	0·48	0·17	0·36
Potato tubers	78·0	2·2	0·1	18·8	...	0·9	0·46	0·12	0·32
Turnips	90·5	1·1	0 2	6·2	1·2	0·8	0·39	0·10	0·18
Mangel-wurzels	90·9	1·4	0·2	5·5	0·9	1·1	0·38	0·9	0·19
Sweet potatoes	71·1	1·5	0·4	24·7	1·3	1·0	0·50	0·10	0·23
Jerusalem artichokes tops (green)	80·0	1·6	0·6	11·2	3·4	3·2	0·31	0·07	0·53
Corn fodder (green)	79·3	1·8	0·5	12·2	5·0	1·2	0·33	0·15	0·41
Jerusalem artichokes, leaves ensiled ...	77·7	2 3	0·5	10·1	6·0	3·4	...	...	
Corn silage	79·1	1·7	0·8	11·0	6·0	1·4	...	...	

From that carefully compiled table it would appear that in feeding value the Jerusalem artichoke is about equal to the English potato, but superior to both the turnip and the mangel-wurzel. It has no starch like the potato, but possesses another similar substance called *inulin*.

Compared with the sweet potato (*Batata*), it is richer in protein or flesh-forming substances, but poorer in carbo-hydrates or heat-producing elements, such as starch, sugar, &c. It contains, however, a certain amount of uncrystallisable sugar, perfectly discernible to the palate.

As to the stems and leaves, they seem to contain about the same constituents as green cornstalks, which are rightly so much thought of as green fodders.

As to soils, the Jerusalem artichoke is not at all exacting. It fears only low-lying, damp, ill-drained lands, in which the tubers rot rapidly and emit a very offensive smell. Otherwise it will do well in almost any soil.

It will give the heaviest crops on rich, friable, sandy loams, and few crops of high-class tubers on poor hungry sands. From that we conclude that it should be tried on our light soils, and on the sand ridges of the West, which are now practically useless to the pastoralist.

The cultivation is extremely simple, and does not require any extra care or skill.

The land should be treated as for potatoes—that is, deeply ploughed and thoroughly pulverised. Then straight furrows are drawn 3 feet apart, then other furrows crosswise, at the same distance. The tubers are then dropped at the intersection of the furrows. If the tubers are large, one will be sufficient; if small, drop two or three per plant. They can be covered with the Planet Junior or simply with light harrows, as they should never be planted deep.

For small quantities, or in stumpy, scrub land, they can be planted by hand with the hoe.

It will be remarked that, by using the cross furrows, the plants are exactly 3 feet apart each way. The scarifier can thus be run in every direction, and no hand-chipping is required.

The only work will consist in keeping the land clean and well pulverised. In ordinary land and in fair seasons no hilling up will be needed except what little earth is thrown towards the plants by the working of the scarifier.

On low-lying land, and in a wet season, it is imperative to grow on ridges to secure surface drainage and prevent the rotting away of the tubers.

The best time to plant is early in the spring or in July or August. The tubers will lie uninjured in the ground until the soil is warm enough to cause them to sprout.

It takes from three to four bags of seed to plant an acre, and the returns are considerably superior to those of the English potatoes, all other circumstances being equal.

In ordinary seasons the crop will be ready in from five to six months.

Before harvesting, the stems are first cut off with the hoe, or, still better, with the horse corncutter described in my article on maize in this *Journal*.

The tubers are then dug out with the fork, or with a double mouldboard plough, or with any ordinary potato digger.

Provided there is no excess of moisture, the tubers can remain for any length of time uninjured in the ground, and may be dug out according to the requirements of the household or of the market.

It is a plant eminently suitable for a farm where pigs are kept—and they should be kept on every farm. They soon acquire a taste for it, and are only too willing to do their own harvesting, thus saving the principal expense connected with the crop.

When the tubers are washed and then passed through the pulper they are greatly relished by all kinds of stock, including sheep.

I cannot help thinking that millions of sheep might have been saved during the last disastrous drought had the Jerusalem artichoke been as extensively grown here as it is in other dry countries, such as the South of France, Spain, and Italy.

It may not be superfluous to add that the plant should be handled with some caution, as it might easily become troublesome amongst other cultivated crops. The best way to clean a field is to plough it and then let the pigs into it. They will destroy every bit of it. In their absence, a couple of ploughings, followed by frequent harrowings with spring-tooth harrows, will bring the tubers and roots to the surface, where they will usually dry up and die.

The crop should be followed by a cultivated smothering plant, such as the cow pea or the velvet bean.

ADMINISTRATION OF MEDICINES TO ANIMALS.

By HAROLD LEENEY, M.R.C.V.S.

HOW IT SHOULD BE DONE.

What a bold man the first must have been who gave a horse a ball! Did he get his hand bitten, one wonders, and so learn to pull out the tongue, or turn it up with the other hand as we do now.

Giving a ball is really a very simple matter, yet how comparatively few horseowners or their grooms can be relied upon to give medicine in this convenient form? It is only fear of an unmeasured danger that prevents anyone from becoming expert in this matter, and with but little practice. The serious preparations most people make when about to give a ball defeat the object by creating alarm in the mind of the patient, who should find the bolus in a position from which he cannot reject it before he has become aware of any unusual attention.

HOW TO GIVE A BALL.

A plain hempen halter, hanging loose, is all the apparatus required, unless one includes an old kid or dog's-skin glove on the right hand, which should be already on the hand before the patient is turned round in the stall. As every horse at some time or other has his mouth opened—to look at his age, and daily to receive the bit—he should not be alarmed thus far in approaching him with a view to seizing firmly hold of the tongue with the left hand, and instantly turning the point upwards in such a manner that, if a gelding or entire, the tip of the organ will be touching the tusk in the upper jaw. If this is done quietly, but quickly, the mouth presents itself as a funnel, up which the right hand is rapidly passed, and the ball left behind. The hand, with the thumb in the centre, and the ball held between the fingers, is not such a large obstacle that it cannot be passed up the mouth of any but the smallest ponies. It is absolutely safe from being crushed by the patient's molars so long as the operator's left hand firmly grasps the tongue and keeps it pointing upwards. Scratching the knuckle of the first finger is avoided by the use of a glove.

The control of food or other bodies in the mouth does not extend beyond that part of the tongue where it is most arched in shape and at its greatest thickness. A ball, then, should be placed as far back as this portion. The involuntary muscles act upon the morsel, whether of food or physic, when it passes the rough boundary line above indicated, and in most cases has to be swallowed; not in all, as some individuals acquire a knack of holding the ball, which they cannot easily eject, until a more convenient season, then to make use of the muscles of the cheek and tongue in a manner at no other time noticeable, and resulting in movements which indicate the animal's intentions.

To guard against those cunning old customers who presently drop the ball, the halter lead, which was hanging loose before giving it, should be quickly wound round the mouth immediately above, or even pressing upon, the nostrils. This little precaution generally decides the waverer, especially if the nostrils are depressed in the manner of the mother who pinches the baby's nose to induce him to swallow the teething powder. The operator meantime watches the channel of the horse's neck on the near side, where he will see it bulge as the ball passes down the first third, but something like half-way down, the gullet ascends above and continues its course behind the windpipe, and the moving mass is lost sight of. Some horses, while holding a ball, will swallow their saliva or a pellet of food which was previously in the mouth, and in advance of the ball, and this movement down the channel of the neck may deceive the novice. The passage of a ball is, however, much more marked and prominent, and a person who has never seen one go down before will involuntarily exclaim, "There it goes," if he is asked to watch for it. The old rogue who has coughed back balls before, finds it very difficult to do so if the rope lead is wound round his mouth, and where there is any doubt he may be offered a go-down of water. If a horse drinks or takes food immediately after giving

him a ball, the attendant can be quite sure he has swallowed it, as one can if a dog licks his nose after a pill.

The reader, it is hoped, will excuse the amount of space devoted to horse-balling, when he is reminded that many drugs act better when given in this form, and some are practically inadmissible in any other.

THE BALL THE MOST POPULAR FORM OF MEDICINE.

As an example, one may mention such agents as camphor and tar, which will go into a paper or tinfoil-covered ball without causing nausea to the animal, and by their gradual absorption act much better than if administered in the nauseous and inconvenient form of a draught; or we might call attention to the peculiarity of aloes which, in the shape of a ball, still retains a monopoly of the name "physic" in stable nomenclature. Five drams as a bolus is a reliable aperient for a horse of 15·2 h. in England and 6 dr. in Scotland; but should this quantity be dissolved and given as a liquid, its action will be chiefly upon the kidneys, and its aperient qualities inappreciable, or at least uncertain.

GIVING DRAUGHTS OR DRENCHES.

Medicines in the form of draughts or drenches can never be superseded, and it is often desired to give fluids with a view to immediate entrance into the circulation, and such agents as alcohol, æther, and ammonia must be largely diluted. What has been said in regard to the restraint of the animal in preparation for a ball applies to some extent when a draught has to be given. A quiet man will often succeed alone in drenching a horse or cow, where several with twitch and stable fork and much coercion fail.

If the patient is made to stand with his left or near side close to a wall, and the operator is not short or the horse very tall, he may often succeed in holding up the patient's head just above the level, and pour in little by little the required dose from a champagne bottle or other one of the strong and sloping shouldered variety.

It may be taken as an axiom that a horse should be drenched slowly and a cow as fast as you like, provided that in the latter you give warning by touching the palate of the cow with the neck of the bottle.

It is true that cows are more frequent sufferers from medicines going the wrong way, but it is, in my experience, due either to neglect of the warning that something is coming, or else to tipping up the bottle, and dividing the draught into sips, as we do with horses.

Bottles have very generally superseded the old-fashioned horn, which was not without its advantages in being unbreakable, but much more medicine was impartially distributed over the persons engaged when horns were in vogue. Tin bottles combine several good points in not being easily broken, in having depressions for the finger and thumb, in the length of neck, and the easy flow which a tube-ventilator affords. Like the horn, it is not so easily cleansed from drenches containing insoluble matters, and certain acids and other substances act upon the metal, which would not affect glass. The worst of all accidents that can happen with a bottle is to get the neck crushed between the teeth of the patient, but, easy as this would appear, it is hardly ever known to occur.

It is certainly an advantage to be able to see the contents of the vessel from which medicine is being administered, and this cannot be done in any but a glass bottle.

ELECTUARIES.

In dealing with acute sore throats, neither the time-honoured draught nor the ball is suitable as a form of medicament, for either is liable to bring on a paroxysm of coughing and perhaps choking.

Suitable medicines my then be mixed with honey, glycerine, or syrup, to the consistency of ordinary jam, and being placed upon a flat instrument, as a long paper-knife, smeared upon the back of the tongue.

POWDERS.

These are dearly beloved of the incompetent, as they can be thrown upon a damped feed of corn and chaff or mixed with a bran mash, but they have the great disadvantage that things pungent or nauseous will not be eaten. Individuals differ very much as to what they will eat in the way of drugs. Some turn up their noses and display the most evident disgust at a little sulphur and nitre, while others will make no objection to such malodorous drugs as asafœtida and copaiba. The powder is most useful where sheep in large numbers require medicinal agents, and they are not so fastidious as horses or cattle. Bitterness seldom disgusts, as so many food plants are bitter.

This enables us to give such unpleasant drugs as Epsom salts in food, and such bitter tonics as gentian and calumba, bark, and even sulphate of iron, if nicely masked with salt and fenugreek, or other favourite condiments of neat cattle.

Powders are also preferred for pigs, and one is inclined to laugh at some directions one sees, to give a tablespoonful so many times a day to a hog weighing 30 st. or 40 st., and whose opinions on the subject are even more weighty.

Condensed drugs in the form of tabloids are hardly as yet available for the horseman, though convenient for the veterinary surgeon with his "squirt gun," as Americans dub the subcutaneous syringe.

With this instrument, the most potent drugs are introduced direct into the circulation, and with great effect. It is, however, with medicines which the stockman will have himself to give that we would confine ourselves in this article. In the previous pages we have supposed tractable subjects accustomed to restraint, but it often happens that animals in need of medicine have never been brought under discipline or are frightened, angry, or in so much pain as to make them irresponsible, though accustomed to restraint and obedience under ordinary circumstances. There is room for a considerable display of tact and much resource in the administration of medicines to animals differing so widely as the ponderous dray horse and the lady's lap dog. Those who know both equally well will prefer the great beast as the most tractable under ordinary circumstances. Both are, however, liable to delirium, and a horse that weighs something like a ton is an inconvenient creature to handle when no longer responsible for his actions. The little dog can be wrapped in a towel or lassoed, or, if he have a collar on, a hooked stick may be used to secure him. Craft, and guile, and mechanics have all to be called into requisition in treating the unbroken colt and the wilful pet, as well as the valuable animals in menageries. Many people were struck with the resourcefulness of Lord George Sanger in giving bread soaked with cyanide of potassium to the man-killing elephant, whose life was sacrificed to public sentiment, for no one knows better than the popular entertainer that such a loss was unnecessary, and only suffered out of respect to a very general prejudice on the part of the public.

THE INHERENT SUSPICION OF ANIMALS,

even domesticated ones, lends colour to the belief that a condemned cat has prescience of her fate, or a sense of impending disaster, and cannot be found when the hour of execution arrives. They are the most difficult of all animals to trick with medicines, and not the less difficult to compel. This may be said of all the feline tribe, and the late Mr. Bartlett and his able coadjutors at the "Zoo," employed every device to convey medicines when necessary. Dogs can often be got to take a medicine in a *bonne bouche* by awakening their jealousy, but cats are "not made that way," and do not care who else has the suspicious morsel, so that they do not.

If for no other reason than the possibility of having to medically treat colts at an early age, breeders may be urged to halter them while sucklers. There

are many others why this should be done, but they are outside this paper, which has a tendency to grow too long, to name them.

METHODS OF RESTRAINT.

We have described the giving of a ball, but not provided for the operator's safety if the patient happens to be pugilistic and strike with his front feet. This vice is the most dangerous of any, and a known striker should be prepared with knee caps and stood up to a wall, while the "medicine man" gives the ball from the other side. Where such conveniences do exist, or for other reasons a ball or draught must be administered in the patient's own box or stall, a good old-fashioned plan is to put a collar on, and attach to it a sack containing a couple of bushels of corn. The weight and bulk suspended in front of him makes it impossible to strike a person or injure himself.

THE TWITCH

so unnecessarily resorted to by many stablemen may, in some cases, be excusable, but in most instances affords more assistance (if the loop is large) when put in the mouth and used as a means of holding the head up instead of that dangerous, but common practice of forcing it up with the tine of a stable fork inserted under some part of the head, collar, or halter. Gentle traction on the tongue, when the animal refuses to swallow, has more effect than stroking the windpipe outside, as one generally sees practised. Pulling it out and letting it go suddenly invariably results in a gulp of more or less of the medicament. Some horses are subject to vertigo when the head is held up for long together, or at any great angle, and the writer has been more than once knocked over when drenching such subjects. If the drink is a "long" one, an interval may be allowed, but before the animal is permitted to depress his head, the man should be very sure he has not been holding the fluid in his mouth. If it is necessary to use mechanical power in raising the head of an obstinate horse, the cord or pulley-hook should not be attached to a fixed point, as it is better to lose a dose of medicine than run the risk of breaking the patient's neck.

In drenching horned stock the neck should be kept straight, and this can only be done when two persons engage in the act. If one does it alone, he naturally obtains more power by pulling the head round to himself, and this makes the animal much more liable to choking. The practice of putting the finger and thumb into the nostrils should be avoided if possible, as the membrane covering the septum is frequently wounded by the man's nails, is painful to the animal, sometimes sets up an ulcer, and always affords a gate of entrance to the blood stream of disease germs.

It is presumed that readers of *The Farmer and Stockbreeder* are too well informed as to the structure of animals to drench calves through the nostrils or pigs by way of the ear, and the writer merely mentions such cruel and ineffectual practices here that owners may be on their guard against ignorant persons in their employ, who may involve their masters in a charge of cruelty by being accessories before or after the fact.

DRENCHING CALVES.

If calves have to be drenched for husk worms in the bronchial tubes, a fairly large dose of turpentine can be given by way of the mouth, and the exhalations act on the parasites. It is all but impossible to get an irritating drench of the kind to pass down the trachea over the highly sensitive membrane which covers the larynx or top of the windpipe, and the remedy is coughed back when attempted, though owners are often deceived by the passage of their medicaments down the gullet, by way of the opening at the back of the mouth (posterior nares). With the struggling pig, if any fluid does get down the ear it is through the eustachian tube, but it is a practice so barbarous and ineffectual that all humane men must wish to suppress it.

Piggie's drench bottle is an old boot, and nothing that the writer has ever seen is equal to it. With the toe cut off and the pig secured, as in the accompanying illustration, he should be slowly drenched, as his obstinacy adds to the

danger of choking from a comparatively small gullet.—*Agricultural Gazette*, London.

WOOLSORTING.

BY H. S. HERMANN SCHMIDT.

From the foregoing explanations *(Q.A.J.*, August 1st), it is evident that a clip of wool cannot fetch a good price unless it is, first, of good qualities; second, free from dirt, seeds, and burrs, &c.; third, unless it has a good colour; fourth, unless it is well nourished; and, fifth, unless it is even *(a)* with regard to the qualities of the several parts of the fleece, and *(b)* with respect to similarity of the fleeces amongst themselves.

The great object of the woolclasser must be so to pack the wool as to create a favourable opinion in the minds of the buyers as to the carefulness and honesty displayed in packing, and the similarity of the fleeces likely to be found in the same bale. In order to produce such a confidence in the mind of the buyer, careful skirting is the principal object. Everything should be removed from the fleece that lowers the average qualities of it—viz., the coarse and kempy parts, such as the tail, parts of the breech, kempy wrinkles, belly wool, &c. Likewise, stained, matted, seedy, &c., portions, unless the latter fault is so widely spread throughout the fleece that it is better to pack such fleeces by themselves altogether. In the western parts of this colony great many backs are mushy—the dirt has settled down on the skin, so that if this part of the fleece is left on, it lowers the average qualities of the fleece very considerably. Where this fault is very conspicuous, it is best to fold the two sides of the fleece on the top of each other, and take out altogether the mushy parts of the back. Such mushy backs are best collected in bags, fastened to the screen, and packed by themselves, or scoured along with the pieces.

A neck should be left on the fleece, except when it is very wrinkly, coarse, and kempy. This is very often the case where coarse-woolled and over-wrinkly Vermonts have been more or less extensively used. Coarse wrinkles are a curse to fine wool-growing.

In fairly even, not too wrinkly, sheep the whole fleece, from the upper part of the neck to the root of the tail and down to the flank, until it becomes broad and shingled, stapled, or curly fibred, and down nearly to the hock, often forms a fairly even assortment of the same grade of wool. In wellbred wool scarcely anything except the belly wool and part of the breech has to be removed from the fleece. In flocks that have been bred with the same style of rams for some time, classing is scarcely necessary—the fleeces will be fairly even by virtue of the similarity of the blood of the sheep from which they are cut, no matter whether the same be fine, medium, or strong woolled.

It is quite different in cases where the flocks have been made up of sheep purchased from several other places, and where different systems of breeding have in succession been adopted. In such cases we generally find a great variety in fineness, density, length, and in other respects. It is just these clips that

give great trouble to a conscientious and careful classer. Here it is often more advisable to disregard the actual degree of fineness and length, &c., but group the fleeces together according to their genetic characteristics with regard to their descent, because, by so doing, we may make, unconsciously, allowances for innate peculiarities not always apparent to ourselves, but which will be noticed by the manufacturer. I have heard such remarks as: "These fleeces, coming from the W—— sheep, are better classed by themselves," and "This lot we got from such and such a station; we had better not mix them with our own." It is in such cases where an intelligent classer must use his judgment instead of working by rule of thumb. Again, it is not judicious to class fleeces together, simply because they are clean or dirty. Dirty fleeces can be scoured—a short and fine woolled fleece does not match with a long stapled one, although both may be very clean. If long and short, coarse and fine woolled fleeces are classed together the buyer must, as a matter of course, find in the same bale a number of fleeces that do not suit him. He does not object to heavy yolked fleeces of the same length and fineness being packed in the same bale with cleaner ones, because he can scour the dirty ones, but he cannot make a coarse fleece any finer, or a too short one any longer.

Whether clean or dirty, it is important that each bale should contain fleeces of the greatest possible similarity throughout. If there should be a great percentage of very dirty fleeces it is best to pack them by themselves and class them as nearly as possible on the same lines as the clean wool. We find so many different styles of wool in Queensland that it is impossible to lay down any hard-and-fast rules how to class wool. We generally find the following descriptions of wool:—Beginning with short wools, we may say that the fine, short, densely grown and shafty super-clothing of the Silesian type is very rare in Queensland. We meet great quantities of a moderately short, blocky, fairly densely grown wool without character, and too broad. There is also a good deal of short wool of an open mushy description.

Amongst the long wools, taking the length of 2 inches as the starting point, we have fine, soft, elastic, regularly grown and shafty combings, and a variety of shades of long-stapled wools of a more pronounced boldness, though still fairly densely grown, up to crossbreds and pure Lincoln, Leicester, Cotswolds, &c. Amongst the medium combings we often meet a rather showy style of wool, very clearly waved, shafty, silky, and of fair length, but flabby, having no pull. This style of wool is generally cut from sheep that have descended from crossbreds. From the former coarse and uneven generations, the present stock has been bred back to the merino type.

The principal rules to be followed in woolclassing may be summed up thus:—

1. Keep ram, ewe, wether, hogget, and lamb wool separate.

2. All fleeces not exceeding $1\frac{1}{2}$ inches are to be placed with 1st clothing, so long as they are very densely grown, shafty, free, of a clear character, and of good qualities generally.

3. Wools of the same length, if broad, blocky, and wanting in quality, go into 2nd clothing.

4. Wools between $1\frac{1}{2}$—$2\frac{1}{2}$ inches from the 1st combing class if they are, like the 1st clothing, densely grown, shafty, free, of a clear wave, and of good qualities generally. In first-class combing wool we also require great strength of fibre, lustre, &c.

5. Wools of a longer staple, having the good qualities less pronounced, form the 2nd combing, whilst all hairy and tough fleeces should form a class by themselves.

It is also necessary to cast out all fleeces of a bad colour—if such is located in the fibre itself. There are plenty of fleeces with an orange-coloured yolk that scour perfectly white; others, again, retain yellow marks after the best scouring. As a rule it is better to throw out all fleeces of a suspicious colour. A good classification should result in (*a*) perfectly even bales, (*b*) in as large

a number of bales containing fleeces as nearly similar as possible. It is better to make less classes than to subdivide a clip in many fanciful grades, and to have as large a number of bales containing a level lot of fleeces.

At the same time, exceptionally good fleeces should be put by themselves. If it is possible to get a sufficient number of bales of such wool, so that it is worth the auctioneer's while to put them up by themselves, they generally fetch a price which rewards the extra trouble of having sorted and packed those fleeces by themselves. If not, no harm has been done. It is always well to bring wools of good qualities more prominently under the notice of the buyer. With regard to sorting wool previous to scouring, similar methods are adopted. It has to be borne in mind, however, that scoured wool cannot be sorted again. For this reason, it is the more important to have the fleeces carefully sorted before scouring. At the same time, as the grades of fineness cannot be accurately ascertained after the wool has been scoured, the best methods of sorting that have been adopted before the wool is scoured do not receive the recognition of the manufacturer. Scoured wool takes second rank to greasy fleece, making due allowance for the removal of dirt and yolk. On some stations attempts are made before scouring to sort the wool for the purposes of the manufacturer. All wool from the shoulder and ribs is placed into No. 1; necks, flanks, and thighs into No. 2, &c. Following this method, no attention is paid to length of staple and the grades of fineness, &c. According to the opinion of one of the professional buyers from a leading house, this method is not to be recommended. Many buyers consider that dividing fleece wool into long and short, &c., keeping the very coarsest fleeces apart, is sufficient for all practical purposes of sorting previous to colonial scouring; 90 per cent. of the cleanest wool scoured in the colonies has to be scoured again. This shows that colonial scouring cannot render home scouring unnecessary, and be of any service to the manufacturer. The chief benefit which the colonial scourer derives from scouring here is the saving of freight. Our scouring is not so much appreciated at home as we imagine, and we should not go to any expense in the hope of aiding the manufacturer. It is to be hoped that the time will soon arrive when the sheep of this colony are bred up to such a degree of evenness that their fleeces do not require any classing. This will appear to many of my readers a rather utopian fancy. At the same time it would be much better to class and to breed the sheep properly so as to obtain much more level clips than breeding so inferior a kind of sheep that their wool requires to be classed before going into the market, a subject which I shall treat in my next letter.

GINDIE STATE FARM.

REPORT ON CROPS FOR MONTH ENDING 30TH JUNE, 1900.

Name of Crop.	Planted.	Area.	Drilled or Broadcast.	Manure Applied.		Rainfall for Month.	Growth during Month.	Date Harvested.	Quantity Harvested.	Total Quantity Harvested.
				Name.	Per Acre.					
Wheat (varieties)—		Acres.				Inches.			per a.	
American Blue Stem	11-4-00	13·14	Drilled ...	...	...	0·92	Good ...	...	...	...
Marshall's No. 3...	13-4-00	38·5	,, ...	...	...	...	,, ...	...	...	...
Marshall's No. 8...	14-5-00	10·86	Broadcast	...	...	...	Only fair ...	...	...	...
Oats	21-5-00	1·30	,, ...	...	...	...	Rather backward	...	...	...
Rye	21-5-00	1·05	,, ...	...	...	...	,,	...	...	...
Allora Spring ...	28-5-00	9·61	,, ...	...	...	...	Very thin growth, poor	...	...	..
Malting Barley ...	29-5-00	9·70	,, ...	...	...	...	Fair	...	...	...
Field Peas	31-5-00	2·90	Drilled ...	...	...	...	Good ...	...	...	...
Budd's Early ..	1-6-00	12·37	Broadcast	...	...	...	Poor	...	...	...

Remarks.—Most of the stud wheats are looking well, and have made good growth, the undermentioned varieties in particular:—Sicilian Baart, Forella, Mica, Egyptian A1, Egyptian A2, Pugh's R.R., Early Baart, Battlefield, Eden No. 1, Dutoits, Champlain's Hybrid.

REPORT ON CROPS FOR MONTH ENDING 31ST JULY, 1900.

Name of Crop.	Planted.	Area.	Drilled or Broadcast.	Manure Applied. Name.	Manure Applied. Per Acre.	Rainfall during Month.	Growth during Month.	Date Harvested.	Quantity Harvested per Acre.	Total Quantity Harvested.
Wheat—		Acres.				Inches,				
American Blue Stem	11-4-00	13·14	Drilled ...	...	...	3·01	Good coming out in ear	...	...	...
Marshall's No. 3...	13-4-00	31·5	,,	...	...	...	Good ...	...	...	...
Marshall's No. 8...	14-5-00	10·36	Broadcast	...	...	...	Fair	...	...	...
Oats	21-5-00	1·30	,,	...	...	...	Rather backward	...	...	...
Rye	21-5-00	1·05	,,	...	...	...	,,	...	...	...
Allora Spring ...	28-5-00	9·61	,,	...	...	...	Poor	...	...	...
Malting Barley ...	29-5-00	9·70	,,	...	...	...	Good ...	...	...	...
Field Peas	31-5-00	2·90	Drilled ...	...	...	...	,,	...	...	...
Budd's Early ...	1-6-00	12·37	Broadcast	...	...	...	Fair	...	...	...

Remarks.—The crops have improved this month owing to the favourable weather that we have had. The weeds have also responded promptly to the welcome showers, and if a lesson was required to decide the question of drilling *v.* broadcast sowing for wheat, anyone could get a good lesson here that would convince the most sceptical in favour of the drill. While the wheat that was drilled is clean and healthy-looking, a good part of the broadcast sown is more or less dirty. The American Blue Stem Wheat is just coming into ear, and, as far as can be judged at present, will give a good return, as it is putting out a nice compact ear of medium length. Unless the wheat makes a very rapid growth during the next three or four weeks, the straw will be much shorter than last season. Some of that which is coming into ear at present date is not more than a couple of feet high. All the stud wheats are looking well. Some of the varieties are putting out remarkably fine ears.

Up to the present the weather has been too cool to start the grass growing, but every available inch of land is covered by herbage of some kind, principally wild carrot, fat hen, wild clover, and stinking groundsel (*Senecio lautus*). The latter are in flower, and look very brilliant. From the cottage veranda one can see hundreds of acres covered with their rich yellow bloom. Looking towards Springsure the eye encounters several acres of these flowers, then the deep green of the wheat immediately behind them, and the distant background made up of the rugged peaks of an off-spur of the Drummond Range, making altogether a very brilliant and pleasing picture.

REPORT ON CROPS FOR MONTH ENDING 31ST JULY, 1900.

Wheat.	Sown.	Area.	Manure.	Rainfall.	Treated.	Growth.
Allora Spring ...	July, 2nd week	7½ acres, drilled ...	...	2·70	Harrowed and rolled	Germinated evenly, and doing well.
Budd's Early ...	July, 2nd week	7½ acres, drilled ...	...	...	Harrowed and rolled	Germinated evenly, and doing well.
Lucerne	29th July ...	7 acres, broadcast	...	...	Harrowed in ...	Germinated evenly, and doing well.

Remarks.—All crops are growing vigorously. Early sowings are quite rank. Cold frosty weather is wanted to harden the wheat.

THE TOMATO AND ITS CULTURE.

By MELA LEUCA.

(In Garden and Field.)

The Tomato (*Lycopersicum esculentum*) is an annual, indigenous to sub-tropical America, and supposed to have been first cultivated by the ancient Peruvians. For the cultivation of the plant and the maturity of the fruit a certain amount of heat is essential, and, as under the most favourable conditions at least four months are required from the sowing of the seed to the ripening of the fruit, it is absolutely necessary, if early tomatoes are required, that the plants be raised under shelter of some kind. To sow seeds in August and obtain a supply of fruit by Christmas in the neighbourhood of Adelaide may be

considered good gardening. If the seed is sown in a frame or otherwise protected and forced a little, the plants will be ready for putting out in six weeks. So that to sow at the beginning of August will give strong, well-developed plants in the middle of September, which is quite as early as it is wise to put them out. If those who pine for very early tomatoes will bear this in mind, they will see that they must either obtain them from warmer localities than Adelaide, or follow the practice of growers in Southern California, where there is no frost, and the late-sown tomato plants fruit right through the winter, as, indeed, they have been doing with the writer of these notes this season at Upper Mitcham up to the present. The fruit does not ripen properly on the plants, and when ripened indoors it is of poor quality, but such fruit sells well in California until the new season fruit comes in. Now, those who care to protect their plants from the frost through the winter will find they will produce the desired early fruit. It is best that such plants be not raised until after the new year, or they may be sown for the purpose in May and kept under glass. It is not at present profitable to grow very early tomatoes, except where the conditions are specially favourable. In Sydney and Melbourne the early tomatoes are imported from Queensland.

The tomato does not require a very great supply of water, but it must have enough to sustain its health and vigour of vegetation. For preference rich, mellow, warm, loamy soil is best, but with care the tomato can be grown in any soil during the summer season. For early crops a warm well-drained soil and a sunny aspect, sheltered from the south, south-west, and south-east are necessary.

RAISING EARLY PLANTS.

For successful germination the seeds of the tomato should have a temperature of not less than 55 degrees Fahr. at night, and 65 or 70 degrees in the day time. Those who cultivate tomatoes on a large scale under glass in England consider a steady heat of from 60 to 65 degrees Fahr. the best for raising plants.

The readiest plan for the tomato-grower here is to level off the top of the manure heap (provided it is not in the pigyard or is the usual scratching place for the fowls). Before doing so, it is very desirable that the manure should have several good forkings up to let in the air, and induce a good fermentation. Quite fresh manure is not good. Then trample it down, and on the part intended for the bed put 4 inches of sandy soil. Round this put boards from 8 inches to 12 inches wide, and heap the manure round the outside of the boards. If one or two old windows are available, make the frame so that they will just fit on top; if not, provide a cover of calico. Let the bed remain a few days, and when the top of the soil feels just warm to the hand sow the tomato seed, and if the conditions are favourable the plants should appear in eight or ten days. As soon as they begin to appear the bed should be uncovered as much as possible during the day. In very wet weather keep the heavy rain off, and keep covered whenever the temperature of the air is below 60 degrees.

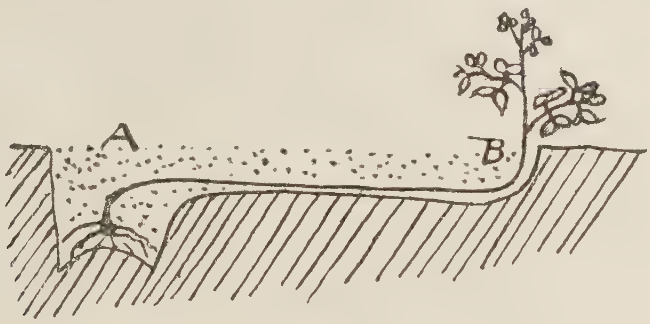
If it is desired to hurry the plants they should be pricked out into pots, shallow holes, or another bed when they have six leaves.

For a limited number 3-inch pots are best, but to plant 3 inches apart in boxes or in a bed in a frame will answer well. In either case the essentials to success are that the plants shall not be checked by cold or unduly forced by too much warmth. From the middle of August onwards they will do well, and produce fine sturdy plants if well protected from frosts and during any spell of bad weather. A simple cold frame is all that is required. Many growers sow thinly and simply leave the plants in the seed bed on the manure heap until ready to plant out, and then put them out, and protect at nights for a few weeks with empty boxes, empty kerosene tins, or such like articles. I have known old newspapers stretched over four sticks to be used with success.

FOR THE HOME GARDEN.

For the majority of the readers of the *Garden and Field*, who only grow tomatoes for their own use, manure heaps, hot beds, and even frames are not available. How can such secure early tomatoes? As a dozen plants at most are all they require, the best course is to buy a pot from the nurserymen.

"It saves a power of trouble." Get them, however, as soon as possible, and prick out the six largest into well-drained 4-inch pots, and as they get too large for these move them again into larger pots. Put them in the sun in the day, and under the veranda or indoors at night. In this way it is not difficult to have strong plants 1 foot to 18 inches high, with several trusses of flowers and a few fruits, by the time it is quite safe to plant them out. It is not then necessary to plant out so soon, and earlier fruit can be secured by flowering the plants in pots or boxes. Half kerosene tins placed against a north wall make excellent boxes in which to grow early tomatoes, and one or two plants can be allowed to remain in the tins until they ripen their fruit.



TO PLANT TOMATOES WITH LONG STEMS.

Shows method of planting tomatoes with long stems. A is the usual hole for the roots. From A to B is a shallow trench, in which the stem is laid, being turned up at B as shown. The stem from A to B is covered 1 inch deep in soil, and puts out roots all along.

Those who are away from nurserymen will find the plan my mother used to adopt will secure the desired results with very little trouble. Procure a small shallow box, such as a blacking box, or the top 4 inches of a kerosene tin, or half-a-kerosene tin cut on the flat, or a 6-inch flower pot, according to the number of plants you want to raise. If the box be 4 inches deep put quite 1 inch of drainage. Broken brick, gravel, or sifted cinders do well. Over these put a thin layer of cocoanut fibre, fine dry grass, or such material, and fill the box with a mixture of half rotten leaves and half sand, or half sand, quarter old rotted cowdung, and quarter fine free soil. Moisten this thoroughly, without soaking it, with warm water, and sow the seeds 1 inch apart. Stand this in the kitchen at nights and in cold weather, and on sunny days put it out in the sun. See that it does not dry. A sheet of glass placed on top is a benefit. When the plants are 2 inches high, or have four leaves besides the seed leaves, they should be pricked out and dealt with as before described.

In Maryland and New Jersey (America), where the tomato-growing industry is so great that nearly 2,000,000 cases are produced annually, the plants for hundreds of acres of early crops are raised under glass, pricked out in pots, boxes, or beds, and kept so until "they are from 12 to 15 inches high, with strong, well-fibred stalks as thick as one's finger, with a number of crown blossoms and numerous side branches."

PREPARATION OF SOIL.

The land for a tomato crop should be worked deeply and manured well, preferably with both stable manure and artificial fertilisers. The American growers find, however, that a too rich soil, or rather a soil in which the fertiliser has been widely distributed, as is preferable when most crops are grown, is not desirable in the case of tomatoes, says Professor Voorhees, of New Jersey,

speaking on this subject in "Farmers' Bulletin," No. 76, because "such soils tend to produce a too rapid and too large growth of the vine, thus partially defeating the purpose in view—namely, a quick growth of plant and a rapid development of fruit. The active fertilising matter should be concentrated within the immediate reach of the roots. A soil not naturally very poor, in which the added fertility may be provided, both as to place and time, as will best serve the purpose, is most desirable. A light, sandy loam, high and well drained, is perhaps the ideal for early tomatoes, provided the proper nourishment is given from artificial sources."

The plants are best set about 4 feet apart each way. A well-proved American practice is to apply 400 lb. of superphosphate and 200 lb. of muriate of potash per acre, and thoroughly harrow it in. When the plants are being set from 100 to 150 lb. of nitrate of soda per acre are applied to the places where the plants are to be set. Three or four weeks later another application of from 100 to 150 lb. of nitrate of soda is given, the nitrate being mixed with fine dry soil to ensure more even distribution. In this way all the nitrate is placed where it can be used by the roots, and the plants respond splendidly to the treatment. The soil should be well worked until the plants begin to cover the ground.

YIELD.

I have several times endeavoured to obtain accurate data for estimating the yield in Australia, but without success, so far as an accurate average is concerned.

Growers know how many cases they take off a plot, but seldom know the exact area. I have estimated that from 5 to 8 tons per acre are considered from a fair to a good crop, while I get at the rate of from 15 to 20 tons per acre on small areas and favourable conditions. In New Jersey the average for 2,500 acres devoted to "early tomatoes" is given by Professor Voorhees at 6 tons (2,000 lb. to a ton) per acre. Wickson, in his "California Vegetables," says: "Twelve and a-half to 15 tons of marketable tomatoes have been gathered as an average per acre from large tracts in Alemeda County." He also says: "Mr. Ira W. Adams reports that he grew one year 136 lb. of ripe tomatoes from one vine, and when the frost came picked 34 lb. of green fruit. The vine covered a space of nearly 8 feet square, and grew on the edge of an irrigation ditch."

B. C. Ravenscroft, in his very excellent little book, "Tomato Culture for Amateurs" (L. Upcott Gill), a book chiefly devoted to growing tomatoes under glass, says that plants kept to one stem should yield, at least, 5 to 10 lb. of fruit apiece. More than that would be a good crop; less, a poor one. As much as 20 to 25 lb. of fruit per plant is occasionally obtained by a skilful grower. Such plants are grown 2 feet apart, but are often trained from 10 to 14 feet high under the roof of the house.

VARIETIES.

The number of varieties is as confusing in this case as in others. Many of them are mere selections named to sell. For market and preserving purposes, under Australian conditions, the big, old-fashioned, somewhat coarse, badly-shaped, rough "large red" is, without doubt, the best paying tomato. For show purposes a standard is badly needed. The following are standard sorts, and good:—The Acme, Trophy, Mikado, Fordhook First, and Matchless. There are many new sorts, and in buying them the grower may secure something extra good; and, at all events, he has a novelty which costs more than the ordinary sorts. Messrs. W. Atlee Burpee, the great seed merchants and growers of Philadelphia, state that if they were confined to one sort they would choose the Matchless as being the best all-round tomato. I grew it last year, and found that it was of splendid quality, a fine shape, large, and handsome; but the Fordhook First did the best with me so far as crop was concerned.

THE CULTIVATION OF HORSERADISH.

In European countries, and especially in England, no dish of roast beef would be considered perfect unless garnished with scraped horseradish, or with the adjunct of horseradish sauce. In this colony, probably not one in a hundred of our beef-consumers knows what kind of a vegetable it is, or if they know the name, they are ignorant of the uses to which it is put. In Germany and France the cultivation of the horseradish is a specialty with many market gardeners, and great care is expended on the plant.

From the *Journal of the Board of Agriculture* we take the following method adopted in Bohemia (Germany) for the cultivation of horseradish:—

Horseradish is grown on a considerable scale in various parts of Bohemia. The variety of horseradish known as the "Maliner," or "Maliner Kren," is considered superior to any other. It is distinguished by its unusually sharp, penetrating taste, uniform shape, and excellent keeping qualities.

According to Mr. H. Schmidt, of the Agricultural College in Leitzmeritz, Bohemia, a deep, loose, strong soil, with plenty of moisture, is considered the most suitable for the growth of horseradish. In the autumn the soil is forked over to a depth of 2 feet or $2\frac{1}{2}$ feet, and well-rotted farmyard manure is thoroughly worked in to the depth of 1 foot or more. A narrow bed, 3 feet wide, is then prepared, and late in March (August) or early in April (September) the horseradish cuttings are planted along both edges, alternating so that they are not opposite each other across the bed. The cuttings are 12 inches long, and are set out 18 inches apart. Instead of being placed vertically in the ground, they are planted in an oblique position, with the upper and larger end covered by only $\frac{3}{4}$-inch to 1 inch of earth, while the lower lies 3 inches or 4 inches deep. As a consequence of this slanting position, the new roots thrown out from the lower end of the cutting strike vertically downward, making nearly a right angle with the main stem, and it is from these slender roots that the new cuttings for the next season's planting are made. During the summer the ground is kept free from weeds and the surface of the soil lightly stirred. Towards the end of June (November) the bed is gone over carefully, and each cutting uncovered separately and slightly raised out of the soil with the hand. Care is taken not to injure the perpendicular roots which have formed from its lower end. All small rootlets are rubbed off from the body of the root with a woollen cloth, those that are too large to be removed in this manner being cut close with a sharp knife. A small quantity of powdered charcoal is scattered over the cut surfaces to prevent decay, and the cutting is again covered with earth as before. In order to keep the new roots of a uniform diameter, and to prevent their striking deep into the soil and becoming too slender, the beds are sometimes underlaid with a porous cement pavement, $1\frac{1}{2}$ feet below the surface of the ground. This pavement checks the growth of the young roots and causes them to thicken.

The roots are allowed to continue their growth until the end of September (February), when the harvest begins. The cuttings, which have been two seasons in the ground, first as vertical roots and afterwards in the oblique position, are by this time large enough for market. In digging the horseradish a long-bladed mattock or spade is used. This enables the digger to remove not only the obliquely planted cutting, which is the marketable product, but also the new roots from its lower end, of which the cuttings for the next year are to be made. The radishes are sent to market in neat bundles of several dozens. The uniformity in length and diameter is remarkable, the average thickness being about $2\frac{1}{2}$ inches at the large end and $1\frac{1}{2}$ inches at the other. Restaurants keep their supplies of horseradish quite fresh for several months by planting the roots in cool cellars in moist sand, and the cuttings held over for the spring planting are kept in the same way.

EXTRACT FROM MONTHLY PROGRESS REPORT FOR JULY OF THE BIGGENDEN STATE FARM.

During July the weather was characterised by sharp frosts occurring on the second and in the middle of the month. At reiterated times the thermometer on the grass dropped as low as 17 degrees below freezing point. All tender plants, such as arrowroot, sugar-cane, pineapples, &c., have been severely affected.

Those frosts have been invariably followed by abundant and beneficial rains, 3·23 inches having fallen in six days. The last part of the month has been very mild, and as the soil is well soaked all winter crops, such as cabbages, cauliflowers, turnips, carrots, &c, have made good progress, and have fairly recovered from the effects of the previous drought.

During cold and dry weather good progress has been made with the subsoiling of the experimental plot. Unfortunately that work had to be interrupted for a while, as the hands were required for the planting of the orchard. This work, personally supervised by the Superintendent of State Orchards, Mr. S. C. Voller, has been done during the last week of July on a previously well-prepared piece of land. The trees experimented with include different varieties of olives, oranges, mandarins, limes, lemons, custard apples, loquats, persimmons, figs, plums, and peaches. The trees are planted on the square, and are exactly 32 feet apart each way. There are eleven and a-half rows containing seventeen trees each. The weather being now favourable, and over 40 points of rain having fallen as soon as the work was finished, the trees should get a good start and do well. The orchard is a great improvement to the farm, and will be watched with keen interest by many settlers of this district. It is situated on the north-western side of the cultivation paddock on both sides of the vineyard, which occupies the more gravelly part in the centre.

The vineyard had also been ploughed on the 10th and 11th, and in accordance with Mr. Rainford's directions.

The different varieties of English potatoes have been dug out, and saved for future use as seeds. A great many plants have perished through dry weather, and the whole crop has been retarded for from four to six weeks. Still we could save a few very fair specimens from nearly every variety. Some specimens of the Early Vermont, Early Rose, and Circular Heads turn the scale at from 6 to 10 oz. per tuber. The Blue Skins, though of good quality, are relatively small.

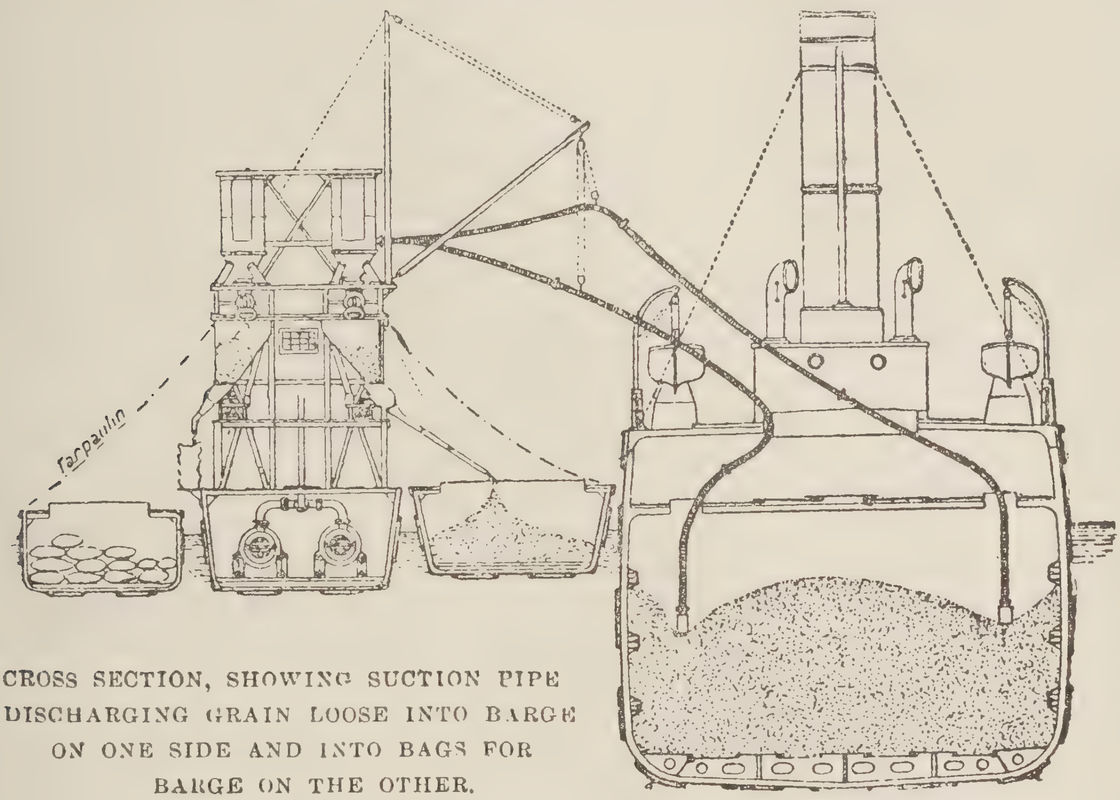
We have also dug out a small plot of peanuts. This is certainly a most valuable crop, and one likely to do well in a large portion of the colony. The drawback lies in the harvesting, which is both slow and tedious, unless it can be done personally by "the gintleman who pays the rint," and who has the privilege of getting rolling fat by working at it for his mere tucker! In any case, that useful animal should always be made use of for the gleaning of the nuts which remain in more or less large quantities in the ground.

We have, during the month, prepared a collection of our products for the Agricultural Museum of Philadelphia, in the United States of America, and another on a smaller scale for the Educational Museum of the Albert School, Maryborough. About ten days have been occupied in preparing exhibits and attending with them the Maryborough Show. I am glad to be able to report that the work done by the Department on this farm has been favourably commented upon by both the Press and the public. Great praises have also been given to the splendid collections and individual exhibits sent to the show by the district surrounding the farm, thus showing to the most unobservant eye that agriculture is progressing in this part of the colony. Our thanks are due to the Biggenden Agricultural and Pastoral Society, who have kindly presented the farm with the fine collection of local timbers they had on view at the show. Those timbers are now displayed in our exhibiting shed, and elicit considerable interest from both local and outside visitors.

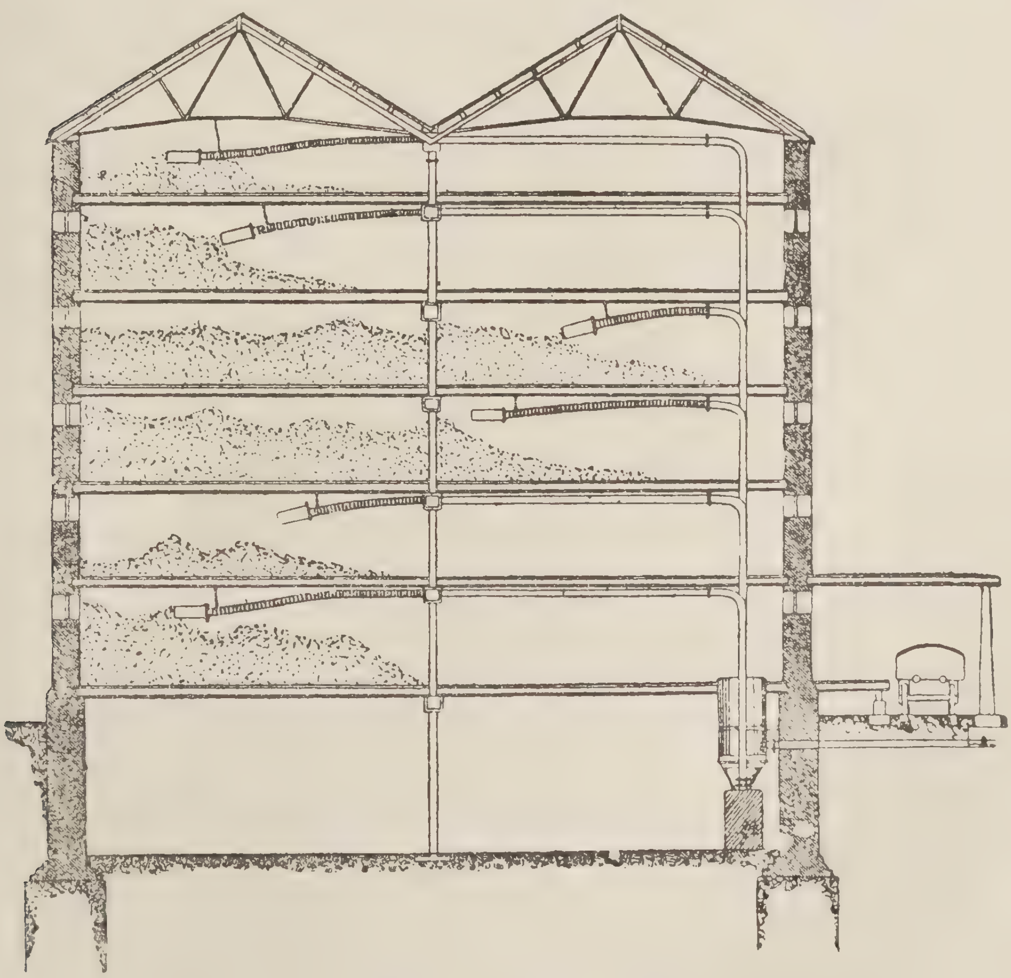
BULK-HANDLING OF GRAIN IN AUSTRALIA.

On the subject of elevators and the despatching of Mr. J. Mathieson to America to study the whole matter in the interests of Victorian grain-producers, the *Pastoralists' Review* goes on to say:—

When these preparations are complete, there will come the difficulty of securing freight for wheat in bulk; the Imperial Merchant Shipping Act prescribes stringent regulations enforcing expensive fitting up of vesssls, which, it



CROSS SECTION, SHOWING SUCTION PIPE DISCHARGING GRAIN LOOSE INTO BARGE ON ONE SIDE AND INTO BAGS FOR BARGE ON THE OTHER.



SECTION OF A SUCTION PIPE GRAIN ELEVATOR.

is stated by experts, would add from 1⅝d. to 2½d. per bushel to the rate of freight, besides the charge made for the use of the elevator, which is estimated at 1½d. It is very doubtful under these circumstances whether the agitation for the adoption of the system will not land the Governments who introduce it into heavy expenditure without any result or benefit to the wheat-grower. The fact is that our wheat trade is not large enough nor certain enough to warrant a system which is successful under American conditions.

Our illustrations, which are from *Farm and Dairy*, should have appeared last month.

REPORT OF WORK AT THE QUEENSLAND AGRICULTURAL COLLEGE.

JULY, 1900.

The planting of artificial grass has been delayed by the large amount of rain which fell, especially towards the latter half of the month. The season has been a most favourable one. The crops that were planted for green fodder have grown remarkably well, so much so that we have abundance to feed the whole of our stock. It will, therefore, be unnecessary to touch our ensilage this season. We have a crop of 28 acres of excellent potatoes ready to be taken from the land, but the wet weather has prevented our doing so. An area of 1½ acres has been planted with *Paspalum.* A good deal of thinning out has been done among the root crops. The land has been prepared, and 32 acres of malting barley planted; also, 11 acres of peas. An area of 9 acres has been fenced off from the pig and calf paddocks, ploughed, and 4½ acres planted with Belatourka wheat, the remainder with field peas. This work, with the usual amount of haulage of goods from Gatton, has kept the teams busy. In addition, preparation was made for the College exhibit in Brisbane on 8th August. The stud wheats and other crops are, owing to the mildness of the season, in a very flourishing condition. The sheep have been fed on the cultivated land in order to keep down weeds.

At the Gatton Show, held during the month, a number of cattle and pigs, together with the draught stallion, were shown as a non-competitive exhibit. It is needless to state that much time and special attention must be given to preparation and transport of exhibits for show purposes.

In the mechanical department, the erection of the hayshed was proceeded with, but the building is not yet completed.

The extension of the men's quarters has been finished.

Ground for a poultry-yard has been marked out, and the holes for posts dug.

The electric lighting contract is been proceeded with, and, it is anticipated, will be completed before the next issue of the *Journal.*

Forty-two head of cows were milked during the period under review. Fourteen of this number were housed at night; these included 6 Ayrshires, 5 Jerseys, 1 Holstein, 1 South Coast, and 1 grade cow. The total quantity of milk passed through the factory—without including that used by dining-hall and private houses—was 1,651 gallons, 1,206 gallons producing 452 lb. of butter, and 445 gallons 451 lb. of cheese. The whole herd were fed on green barley and lucerne. The increase for the month included 3 Ayrshires, 1 Jersey, 2 Shorthorns, and 1 grade. The imported stock are doing remarkably well, especially the Guernsey bull and heifer; the climate appears to suit them. We have already crossed the bull with a few crossbred cows. Twenty-six head of culls were disposed of for slaughtering purposes. Calves from a good sire have been saved from the best of the culls as an experiment, with the view of showing the effect of a good sire crossed with an inferior cow.

Pigs.—Increase for the month, 27 head—11 boars and 16 gilts. The sales of pure Berkshires totalled 7 head—4 boars and 3 gilts. Twelve head were killed for curing purposes and use of dining-hall. Our first litter of pigs—Tamworth and Berkshire cross—resulted in a failure, owing to the pigs being born with tusks, which prevented the mother allowing them to suck.

In the orchard the pruning is well forward, and no signs of disease showing among the trees. The following fruit-trees were procured from Victoria:—Apples, 54 varieties; figs, 7 varieties (including the true Smyrna, White Genoa, White Marseilles, and Pallani); quinces, 6 varieties; pears, 22 varieties; plums, 24 varieties of the leading European sorts; almonds, 4 varieties; cherries, 18 varieties; walnuts, 2 varieties; Spanish chestnuts; apricots, 10 varieties; peaches, 14 varieties; raspberries, 100 assorted, including many of the leading American kinds; American brambles, 5 varieties; currants, 12 varieties; gooseberries, 24 varieties. In addition to the above, 500 stocks, including 5 varieties, have been obtained for the purpose of training students in the propagation of fruit trees, budding, and grafting.

The rainfall for the month was 2·73 inches for seven days, the heaviest being on 3rd July 1 inch; 21st, 68 points; 22nd, 70 points.

The College reopened for students on 12th July, the number enrolled being forty-five.

POULTRY AS A FARM ADJUNCT.

If poultry should be made a specialty on the farm, and the flocks be increased to a number that would permit the farmer to devote his attention thereto, the profit received in proportion to the labour bestowed would be larger than that derived from cattle. In fact, considering that the fowls on the farms really receive little or no care is alone sufficient evidence that with excellent management and the use of selected breeds the farmer would be more favourable to poultry if he would make the experiment. So long have the farmers overlooked poultry, that it is surprising how many inquiries come from that class asking information on the methods of management, yet these farmers are well familiar with the care and management required for horses, cattle, sheep, and swine. It is, however, creditable to such farmers that they are disposed to learn more, and they will make no mistake in placing the poultry department of the farm upon a plane higher than that now occupied. The course to pursue is to gradually increase the flocks every year, and not venture too largely at first, so as to gain experience while learning the business, and in a few years there will be a good profit coming in from poultry, the capital invested having been created by the fowls during the progress of development of the business. Leave the female members of the family out, for they will not be able to attend to large flocks, and begin in the poultry business with a determination to succeed in a few years, securing as much profit as possible with the least outlay for buildings and labour.—*Farm, Field, and Fireside.*

Dairying.

PIGS FOR PROFIT.

Says the *Farmer and Stockbreeder:* Experiments have been made to try and prove what is the best and cheapest food for the production of pork or bacon. So far, the food that has proved itself the best for the production of good bacon is a mixture of barley-meal and bran (two parts barley-meal to one part bran); but this, of course, would cost rather more per stone to produce than that obtained by maize feeding. Nor do pigs fed on the barley-meal-bran diet give such a satisfactory increase in live weight per week as those fed on other foods, for instance barley-meal and separated milk, but this again is rather more expensive. It must not be forgotten, however, that the cost of producing pork depends almost entirely on the state of the corn markets.

FOOD FOR DIFFERENT AGES.

Judging from my personal experience in the feeding of the average farm pig, the following table shows the result:—

Pigs from 6 weeks to 10 weeks old (just after weaning)—

1 part supers.
1 part wheat germ, mixed with separated milk if possible.

Pigs from 10 weeks to 16 weeks old—

2 parts supers.
1 part bran.
1 part barley-meal.

Pigs from 4 months old—

1 part ground maize.
1 part barley-meal.
1 part bran.

For fattening pigs—

2 parts barley-meal.
1 part ground maize.
1 part bran.
(Separated milk a great improvement.)

A little "flowers of sulphur" occasionally mixed with the meal cannot be too highly recommended. It keeps the blood in a healthy state, and is thus a great preventive of all skin diseases from which pigs are liable to suffer.

"Prevention is better than cure." This is the motto for all breeders who wish to have their yards full of healthy stock. If pigs are properly seen after, fed with care, and a little common sense used in their management, the outbreaks of disease will be very few and far between.

When disease does break out, it is far better to pay a small veterinary bill, and thus have the patients properly treated, than save the so-called expense of the "vet." and lose two or three pigs (or perhaps even more) as the result.

Even if you have the right breed of pigs, descended from the best herds in England, you cannot expect them to thrive and remain in a healthy state unless you give them good food and a dry, warm, and well-ventilated sty. Only under these conditions is it possible to keep "Pigs for Profit."

WEANING.

The early batches of litters will now be at about the age for weaning. The aims at weaning time should be to gradually dry off the sow, and to take care that the little ones do not get a check. If less sloppy food be given to the sow,

and she be put on a slightly more nourishing ration, she will soon be again requiring the boar. Sixteen weeks after now, or, say, from the end of May, will be a good time to have as many litters coming in as possible, as the porkers from those will make prime small pork by Christmas or soon after, and there will then be a relief time in the dead of winter, when pigs are most slow to lay on meat. It is as well, when drying off the sow, to see that she gets a good lot of exercise at the time, and remains in the open air out on a pasture, if that be possible. A grass range for sows is a grand saving in food as well as a guarantee of health at this time of the year. The little pigs may have the same range and grass if the weather be fine, and their feeds of grain and meal food be kept up; but they must be penned to feed, and then be only let out for a run if they be wanted to lay on flesh fast. From the day the sow's milk is held up they should be allowed at least as much sweet milk as will compensate for the loss till they are well on the feed on grain and meal. Skim milk should, however, be fed to them in place of water when mixing the meal food, all along. It will make a difference of possibly 25 per cent. in their weight at killing time, and no better use on the farm can be found for it.

GETTING UP STOCK.

In my last notes I left the discussion of the subject of taking up pig-keeping on the farm as a specialty at a rather interesting point—that of choice of breed for the special purpose. It will be a good time just now (whether the farmer buys in young sows and boars, or whether he prefers to rear his breeding stock) to set about the business. Young sows of the large white, Berkshire, or large black breeds, and either a boar of the same, or one to cross with, securing an animal of from 18 months to two years old, or even older, should form the foundation of the herd. Why I make the point of not having a younger boar, and, in fact, of preferring an old one, is for these reasons: not only will the progeny be more numerous, but also the bone and frame of the offspring will be stronger and stouter than when the sire has not yet attained to his full growth and vigour. It stands to reason that a growing male animal needs all its growing propensities encouraging to the utmost if it is to be useful at the stud, and therefore that to take it for stud use before it has reached maturity must be at the expense of later vigour. Should the boar selected be to be used for the purpose of crossing with large-framed sows to obtain quicker-maturing offspring, a boar of the middle white breed will be the best. He should be of good, stout build, and have a strong, masculine-like contour and general appearance. The points of form and shape should be well studied in this animal. Though he may be no better at stud for having been a class prize-winner or for having a pedigree as long as one's arm, he will be all the more likely to stamp his type and characteristics on the offsprings of sows of different types and breeds that he may be the sire of. This boar may be used with Berkshire sows to grand effect in producing at the most rapid rate pigs to make 10 sc. at eight months old. This is the best mark for the specialty pig farmer who is aiming to supply the curing factory.

The choice of sows is worth a mention. A sow proves herself at the first litter. Very good and long experienced judgment is required in the happy choice of the best sows from a litter or from a herd. A long-bodied one for choice, all other points being correct, with already the look that predisposes one to wish one could "use this one to breed from," as is often pityingly remarked by the slaughterman. She should have an even double row of teats of the full number. She should be nice and kindly in temper and disposition, and as tractable as may be. Above all she should be typical of her breed; or, if of a new cross, typical and full of the points that mark a good sow.

As to the age at which to begin breeding from young sows, I would prefer to keep them from the boar till the age of eight months at least. Up to that period young sows should be kept on the steady move, making frame and bone.

PLENTY OF EXERCISE and green food, and sloppy milk food, with as much oat and wheat meals as they will consume, are all needful for young growing sows. At no age should sows carry fat in extra proportion to lean meat; nor should they ever be kept in that long, lean, and hungry condition so many breeders affect as the ideal state of body for brood sows. When the sow is carrying a litter she will need food that will help her best to make them fine and strong. It is curious to note that rich milk fed to breeding or suckling mothers does not tend to make mother's milk. Quickly as some sloppy foods fly or seem to fly to the milk ducts, and are there almost instantly converted into breast milk, that result never occurs when milk has been partaken of. I have known of a woman when suckling a healthy child, on finding the fount of supply low, to drink a glass of beer or stout, or a cup or two of coffee, and to immediately feel the rush of it to her breasts; and the child on applying to them has found there a bounteous supply of apparently suitable nourishment. This semi-exhaustion, and the subsequent gushing flow following a supply of suitable liquid food to the mother, must be more or less the same in all mammalian animals. It must come from the same cause; and be remedied by the same laws or means. The question for the keeper of brood sows, in this connection, is to give the sloppy drink that will best replenish the lacteal supply.

PROFITABLE PIGS.

THE BEST AGE TO KILL.

The question of killing to best profit will depend on two things: the present price in the market or at the factory, and the rate of progression in meat-making the animals are going on at. Pigs, when in a fairly thriving condition and at between three and eight months, grow amazingly fast. The question however, is not growing but meat-making. A big frame does not mean necessarily the primest meat. Pigs of the larger and coarser breeds will make big bone no matter how we may try to convert them to different ways. It comes then to this—that before we can decide as to which is the best age to kill at we must know the characteristics of the breed we are handling. At Calne they ask for a certain thickness of fat in any part of the back, and they pay the highest price for pigs that will average $2\frac{1}{4}$ inches and under of fat, and scale below 190 lb. Outside, that is over this limit, the price decreases. Thus it also follows that there is a type. We have had, long ago, to drop the fixed dates or periods at which it was customary to kill fattened pigs if we have been following pork markets and factories. On the other hand, there are pig-feeders who cling to the sweet little extra bit of money they clear, or think they clear, over home-fed hams. These two ambitions clash. They need not do so if the big-framed pig men will confine themselves to home curing and taking the butcher's or dealer's price for whatever they have in killing condition, regardless of evenness of size and proportion of fat and lean to bone. Allowing the calculations above due weight, rate of progression is the best criterion; and, so long as meat is being made steadily, and food is to the fore, and younger pigs are not being kept back, the best killing age will be that at which the eye and pocket of the owner unite to agree upon. Factory curing, if not as yet so universally adopted in this country as the Continental breeders have made it with them, will have to be the great stand-by if we are to fight the Continental producers in our own best and widest market. Moreover, there are tricks of the trade that it behoves us to assist in stamping out. For instance, there is the one of making Cumberland hams from American ones. That reminds me of a bad case which came under my own notice in West Cumberland some twenty years ago, where an enterprising firm of Cumberland ham and bacon dealers were buying scores of cases at a time of American hams and were sending them to a remote village,

where they had a storing and curing place. Here the foreign hams were metamorphosed by washing and cleansing, and then by resalting and hanging in a smoke-loft, and finally drying, till they could not be recognised for their original quality. They then went back to the town warehouse, and were from there sold out to small dealers, country and town customers, and others, as real Cumberland—home-fed. Most readers will recollect the exposure certain stores and large retailers in London and its western suburbs had to face two or three years ago over faking American hams and passing them off to their confiding customers as Bath and York hams. In one of these instances, that at a well-known stores, the assistant who was called into court revealed the process, which had, if I remember rightly, something to do with sugar and smoke. Rebranding and such kindred faking will go out of use when we make our pigs all of a size, cure them at the same factory, and ourselves buy no other sort of pig meat for our own use. As to the size, should one be able to fix one I should make it as nearly (by weight) 10 sc. as possible.

THE DAIRY HERD.

QUEENSLAND AGRICULTURAL COLLEGE.

Returns from 1st to 31st July, 1900.

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.			
Blink* ...	Ayrshire	21 Mar., 1900	785	3·8	33·409	
Bonnie ...	,, ...	17 April ,,	555	3·7	22·9	
Laverock* ...	,, ...	7 Dec., 1899	502	3·6	20·24	
Linnet* ...	,, ...	15 May, 1900	615	3·9	26·86	
Lavina* ...	,, ...	6 April ,,	789	3·8	33·57	
Rosebud* ...	,, ...	10 April ,,	814	3·3	30·08	
Annie Laurie*	,, ...	30 May ,,	925	3·7	38·33	
Isabelle* ...	,, ...	7 July ,,	562	3·7	23·28	
Ream* ...	,, ...	24 July ,,	138	3·5	5·4	
Lena* ...	,, ...	30 July ,,	24	3·9	1·04	
Effie* ...	Jersey	16 Dec., 1899	362	4·4	17·83	
Jersey Belle*	,, ...	21 May, 1900	612	4·3	29·47	
Opale ...	,, ...	16 Dec., 1899	332	4·9	18·108	
Content* ...	,, ...	1 July, 1900	787	4·7	41·42	
Playful ...	,, ...	14 July ,,	344	4·1	15·79	
Cherry ...	Shorthorn ...	19 Feb. ,,	370	3·5	13·16	
Gladdy ...	,, ...	2 May ,,	799	3·8	34·0	
Hilda ...	,, ...	25 Mar. ,,	688	3·8	29·28	
Kit ...	,, ...	16 Sept., 1899	288	3·6	11·62	
Louisa ...	,, ...	6 April, 1900	714	3·5	27·88	
May ...	,, ...	20 May ,,	695	3·8	29·57	
Nestor ...	,, ...	21 April ,,	688	3·4	26·19	
Folly ...	,, ...	15 Mar. ,,	480	3·8	20·42	
Alice ...	Grade Shorthorn	13 Nov., 1899	535	3·7	22·17	
Eva ...	,, ,, ...	18 May, 1900	711	3·5	27·87	
Ginger ...	,, ,, ...	17 June, 1899	362	3·7	15·0	
Gertie ...	,, ,, ...	31 Mar., 1900	889	3·6	35·84	
Polly ...	,, ,, ...	29 Jan. ,,	620	3·9	27·08	
Rusty ...	,, ,, ...	17 Jan. ,,	688	3·8	29·28	
Sally ...	,, ,, ...	23 Sept., 1899	242	3·9	10·56	
Trial ...	,, ,, ...	26 Oct. ,,	303	3·4	11·53	
Fancy* ...	South Coast	21 Mar., 1900	812	3·7	33·6	
Plover ...	Shorthorn ...	3 July ,,	715	3·6	28·82	
Stranger ...	,, ...	7 July ,,	588	3·8	25·02	
Damsel ...	Holstein ...	5 Dec., 1899	377	3·5	14·7	
Dairymaid*	,, ...	15 Mar., 1900	1,014	3·2	36·34	

Cows marked * were housed at night, and were fed on green barley and green lucerne which was the fodder provided for the whole of the milking herd.

MILK TESTS AT THE ANNUAL EXHIBITION OF THE NATIONAL AGRICULTURAL AND INDUSTRIAL ASSOCIATION OF QUEENSLAND, BRISBANE,

8TH AND 9TH AUGUST, 1900.

FIRST DAY.

	Owner.	Name of Cow.	Lb. of Milk.	Per cent. Butter Fat.	Lb. Commercial Butter.
Morning.	Mr. Mitchell	Murphy	12½	2·8	·392
	Mr. Gorrie	Fairy Queen ...	10¾	4·0	·481
	Mr. O'Shea	Nellie	13½	2·4	·362
	Mr. Beck	Mona	20¾	3·3	·766
	Mr. Gorrie	Beauty	7½	4·0	·336
	Ditto	Magnet	12	4·0	·537
Evening.	Mr. Mitchell	Murphy	13½	4·2	·635
	Mr. Gorrie	Fairy Queen ...	8¾	5·0	·489
	Mr. O'Shea	Nellie	12¾	4·9	·698
	Mr. Beck	Mona	17	5·1	·971
	Mr. Gorrie	Beauty	6½	4·4	·320
	Ditto	Magnet	7	5·2	·407

SECOND DAY.

	Owner.	Name of Cow.	Lb. of Milk.	Per cent. Butter Fat.	Lb. Commercial Butter.
Morning.	Mr. Gorrie	Magnet	8	3·6	·322
	Ditto	Fairy Queen ...	12¼	4·1	·562
	Ditto	Beauty	8¼	4·2	·387
Evening.	Mr. Gorrie	Magnet	7½	4·2	·352
	Ditto	Fairy Queen ...	9½	4·2	·446
	Ditto	Beauty	7¼	4·4	·357

TOTAL POUNDS OF COMMERCIAL BUTTER.

One Day.

	Murphy.	Nellie.	Mona.
Morning	·392	·362	·766
Evening	·635	·698	·971
	1·027	1·060	1·737

Two Days.

	Fairy Queen.	Beauty.	Magnet.
Morning	·481	·336	·537
Evening	·489	·320	·407
Morning	·562	·387	322
Evening	·446	·357	·352
	1·978	1·400	1·618

Poultry.

A LARGE POULTRY FARM.

Although poultry farming on a large scale, or, indeed, on any scale worth mentioning, has not been successfully carried on in Queensland, it does not follow that the business is necessarily an unprofitable one. On the contrary, poultry farming is a very profitable business, and we speak from personal experience. All that is needed in the poultry breeder is a thorough knowledge of the various breeds and cross-breeds of fowls and ducks, and systematic, intelligent management. No one can hope to make poultry keeping pay if he buys 100 birds and huddles them all together in a small house, which is never cleaned out, and throws a bushel of maize to them for their sole food when he has nothing better to do. Fowls require a change of diet, and to be fed at regular times, especially in the early morning. The chickens demand especial attention and special food. We have seen more than once a number of fowls, including turkeys, geese, ducks, hens with small chickens, battling for whole maize. What chance have the chicks in such a *mèlée*, and with such food. People who keep poultry in this way say the business does not pay. The wonder is that they were so sanguine as to expect it would pay conducted in such a style.

There is in the State of Mississippi (U.S.A.) a poultry farm which coins money for its owners. On this farm there are 5,000 laying hens, 1,500 laying ducks, and the turkeys are numbered by hundreds. This farm is worth £20,000, and the business is conducted as a business and a live one. There are thirty incubators constantly going, and every day men go about with wheelbarrows collecting the eggs, which number some 500 dozen a day. The value of the eggs collected during only two-thirds of the year is about £5,000, to which must be added the fowls bred for sale.

WHEN POULTRY PAYS.

When we say a breeder raises poultry for profit, we mean only one of a large number of people. There being a great number of people who do not make it pay, their failure can be traced to poor management owing to lack of sufficient experience, or knowledge of poultry facts, or to carelessness.

The poultry industry is a magnificent enterprise, and even almost surpasses any other industry in value and profits. This industry is now increasing rapidly, and the present work is conducive to future improvement; that is, both improvement in breeds and in improved methods of management.

The location of the poultry house is an important part of the work, yet a good warm house would be of value in most any place.

The breeder who wishes "to make it pay" should select his breed for the purpose that he desires to raise them for—that is, for eggs or for market fowls.

One mistake is the failure to get pure breeds. A good many persons think that common fowls will do, but not so. A pure breed is much better for several reasons, and then, after he has the pure ones, he can make crosses, &c., and still keep the pure breeds.

When a person breeds poultry he should keep an account of everything bought, used, and sold. So at any moment he may know just how he is getting along.

We say that a hen pays if her profits are 1 dollar each year—that is, a hen is supposed to lay 2 dollars' worth of eggs in a year and consume 1 dollar's worth of food.

The individual nest boxes are valuable in deciding which hens do lay the required number of eggs to amount to 2 dollars.

And, last of all, in the poultry business, as in any other business, we must be careful and go slow in the beginning.

Those who make the profit are those began at the bottom and worked their way up.

Often those who don't make poultry pay are those who get discouraged when some trifling matter confronts them—when their best bird is lost, or something of that kind; yet there are no victories without trouble. So be prepared for it and make the effort and succeed.—*Poultry Standard.*

HOW TO RAISE INDIAN RUNNER DUCKS.

Mr. S. H. Penfold, Payneham, South Australia, gives the following instruction for raising this valuable breed of ducks:—

Having had a number of inquiries about the management of the Indian Runner ducks, I thought it would be an opportune time, as the breeding season is now commencing, to give the readers of the "Garden and Field" the benefit of my experience and methods used in hatching and rearing.

I still use the natural incubator—the broody hen—having for a nest half tea chest, turned on its side, and a 5-inch strip of wood nailed across the bottom to form the nest. In this I put damp earth about 3 inches deep, then slightly hollow out the centre, and cover with about 1 inch thickness of hay or dried grass.

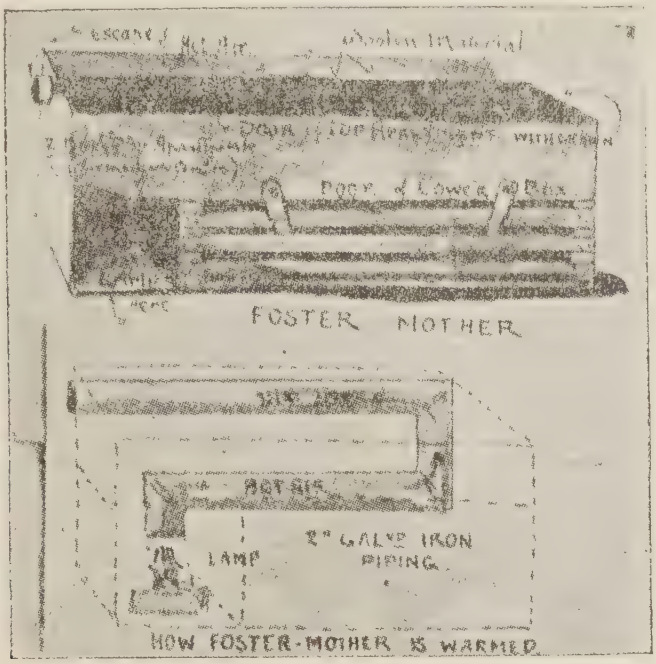
I find the hens take readily to these nests; they are not only comfortable, but convenient, as they can be placed where a hen has become broody; then by placing her in at night, the following night the box and hen can be moved to the sitting pen without disturbing her.

According to the size of the hen, give from nine to twelve eggs. Keep the pen slightly dark, and well feed once a day; the morning is best. Allow her to come off and feed when she chooses. After six days have passed I visit the nest at night, taking the eggs from under her.. I place them in an old felt hat; then cover with a piece of flannel; take them inside and test them to remove any unfertile eggs. This is done by making a pipe $1\frac{1}{2}$ by 6 inches long out of brown paper; then place the egg sideways at one end, and hold up to the lamp and look through the tube with one eye. If the egg is fertile, you will see a red spot and a lot of veins, the whole resembling a spider; if unfertile, the egg is clear. These can be used for feeding young ducks.

I return all fertile eggs to the hen, and allow her to do the rest. I do not supply any moisture other than the damp earth when making the nest, having found that the hen supplies it in the natural way from her body.

When the ducklings are hatched, allow them to remain with the hen for three or four hours; then remove them to the brooder and allow them to get strong.

I never allow the hen to rear them. If you do—generally speaking—she kills half of them. I freshen up the nest, and give her another sitting. She will be quite contented, and will do justice to them. I find it a very good plan to give hen eggs for the second sitting, and allow her to rear the chicks.



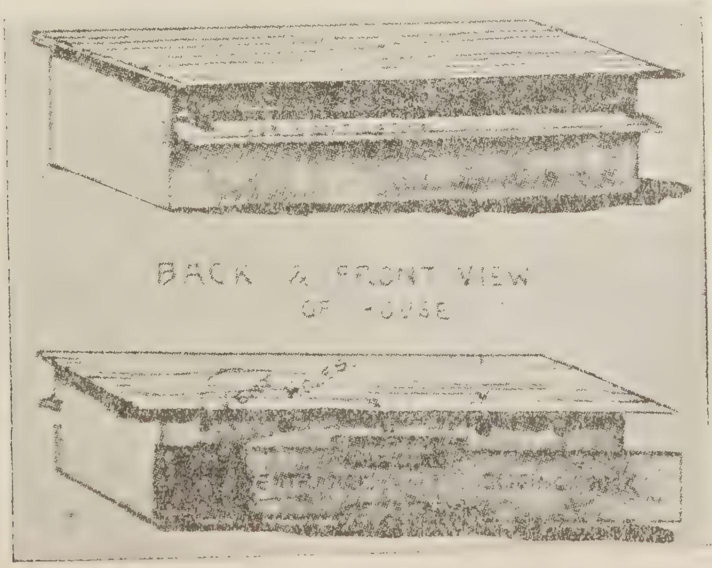
ARTIFICIAL MOTHER FOR DUCKLINGS.

The one used is very cheap and simple, and is made out of a packing case 4 feet long, 2 feet wide, 2 feet high.

This is heated by a kerosene lamp, the same as is used for incubators, which burns without a glass. The hot air passes through the pipes, and warms both top and bottom apartments. The top one is used for the ducklings until they are a week old; then if it is wanted for another brood I transfer them to the bottom.

I use a dry sack as bedding, as it can be put out in the sun during the day and dried.

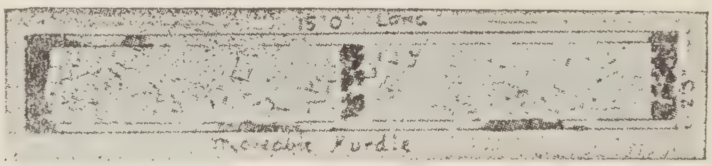
If the weather is wet and cloudy, I allow the ducklings to remain in the mother, and feed them there, but if it is nice warm sunshine I place them in a coop on the green grass, spread a dry sack on the grass at one end of the coop, and place on it a kerosene box on its side, with a few strips of flannel hanging from the top to keep them warm if it becomes cloudy. I replace the ducklings in the mother just before sundown.



I continue this treatment for the first three weeks, when they can be placed in an outside run, with a comfortable house attached. Those used by me are made out of drapers' cases, about 5 feet long, 4 feet deep, and 3 feet high. The zinc is removed, and the case is turned on its side; the cover is made into a sliding door, which can be removed during the day, so that the sun can shine into the case, and keep it dry. I cover the top with two sheets of 6 feet galvanised iron to make it waterproof. I bed them with dry grass or straw.

After they are six weeks old it is not advisable to overcrowd them; about twelve to fifteen are sufficient to be penned in a yard 15 to 20 feet square.

Movable hurdles are very easily made. The following are what I use: Two lengths of 15 feet 2 inches by 1 inch oregon, and three lengths 2 feet 3 inches of 4 inches by 1 inch deal for stretchers. Nail one at each end and in the middle; then stretch and nail a 2-feet wire-netting on the frame so made.



MOVABLE DUCK HURDLE.

Four of these make a yard 15 feet square, and are held together by tying each corner top and bottom with a stout cord. They can be moved in a few minutes to a fresh plot of grass, which the ducklings appreciate very much. It is a good plan to plant thousand-headed kale on any spare ground early in June, about 3 feet apart. By the time the grass is drying up this will have grown sufficiently for the hurdles to be placed around, so that any late-hatched ducklings can be placed in with it. They eat it very readily. This also applies to matured ducks. It also provides shelter from the sun, and if watered occasionally it will supply them with green feed all the summer.

FEEDING.

When the ducklings have become strong, give them their first meal. It is as well to remember that Nature provides them with sufficient food for the first twenty-four hours before they leave the shell, so do not be in too much hurry to feed. I treat them as follows:—

For First Week.—When from twelve to fifteen hours old, give them in a small shallow vessel milk or milk and water, sprinkled with a little oatmeal. Just dip two or three of their beaks in it, and the others will soon find it. Then allow them to return to the warm compartment and dry themselves. In about an hour's time feed with hard-boiled egg chopped fine, sprinkled with pollard or oatmeal and a little sharp grit. On the third day a little lettuce chopped fine can be added. Continue this food for the first week, then feed as follows:—

For Second Week, and After.—Boil all refuse from the kitchen, and run it through an American mincing machine, and mix with it two parts pollard to one of bran; mix rather dry and crumbling. This makes a first-class food, and can be continued for the first eight or nine weeks; then a little wheat can be mixed with their evening meal. This food should be mixed and fed hot when possible.

Feed young ducklings at least six times a day. This can be reduced as they grow, until twice a day is sufficient when about twelve weeks old. Given a good grass run, they thrive quickly, and commence laying about six months old. You can then boil a pluck, and pass through the mincer, and mix with their food occasionally. This will help their laying.

Always feed in shallow tins. It prevents waste. Make them out of a kerosene tin about 3 inches deep; turn over the sharp edges.

Water.—I use kerosene tin with a half-round cut in one side, and the sharp edges turned down. This I find is quite sufficient for them, if I allow them to have a wash about twice a month in a movable bath.

Grit.—This is as necessary to them to masticate and digest their food as teeth are to any animal, so must be supplied. Stone chippings from the stone crushers is a first-class material, or the coarse grit which can be gathered from the gutters after a heavy rain.

Shell is also necessary. Either crushed oyster or small, broken shell from the beach, is good, as it not only helps to make the shell of the eggs, but also assists digestion, and is of great importance to the health of the ducks.

I always keep the following mixture on hand, which is made as follows:—Two buckets of grit, 1 bucket of shell, and half-a-bucket of crushed charcoal; mix well, and keep a shallow tin filled in each yard.

Shade in Summer.—Young ducklings should never under any circumstances be left out in the hot sun, as their skull appears to be so thin that it affects their brain, and causes them to stagger and fall on their backs, and often die. To avoid this, provide shelter of some kind. Thousand-headed kale, as previously mentioned, also tree lucerne (tagosaste), planted in rows, or a roughly-made frame covered with sacking, all make good shelter. It is also necessary to provide shelter for matured ducks if they have no natural shade from bushes or trees.

HOUSING MATURED DUCKS.

If you wish to get all the eggs possible from your ducks, I advise housing them at night, as this is most important, especially during winter. Any style of house will do that is well ventilated, water and draught-proof. Bed them with straw or other suitable material. This is the treatment I have given a pen of nine Indian Runner ducks and two drakes, which are now 2½ years old, and in first-class health. I have also reared some 600 ducklings, the same pen nine ducks, hatched 16th November, 1897, which speaks for itself. The original pen of nine ducks hatched 16th November, 1897, having laid an average of 400 eggs per duck in two years.—*Garden and Field.*

EGG PRODUCTION—CAN IT BE INCREASED?

How is it that so many farmers do not find poultry-keeping profitable? It is probably because the busy farmer does not give attention to small matters of detail. An interesting article on the subject of egg production by Percival V. Cooper has appeared in *The Country Gentleman.* He says an old hen should lay 100 eggs a year, and recommends the use of the axe if she does not come up to that figure. It is possible now to know how many eggs a hen lays. On these points we quote:

Anyone having an intimate knowledge of chemistry with practical poultry-keeping experience, knows that an egg is composed mostly of water, and also that for six months of the year a hen secures about one-half the food she consumes from grass bugs, weed seeds, and other materials. One hundred pounds of grain fed from the bin combined with such other food is ample for the production of 200 eggs in a year—and, what is still more to the point, there are many farms where some of the hens are now laying over 200 eggs by actual count. Trap nests are fast making it possible for poultrymen to keep accurate account of individual egg production; and while a few lightheads may be tempted to exaggerate, still there are fanciers and writers whose reputation cannot be assailed.

It is nothing unusual for an extra good cow to produce twice the quantity of milk that an ordinary cow does for a year; then why cannot an extra good hen double the product of an ordinary one? Any old hen will lay 100 eggs. If she does not, then you should know it and use the axe. Egg production is not governed by the amount of food eaten so much as by the digestibility

seasonableness, and last, but not least, the proper proportion and mixture of foods, so as to contain the exact elements needed to support life and supply egg producing nourishment.

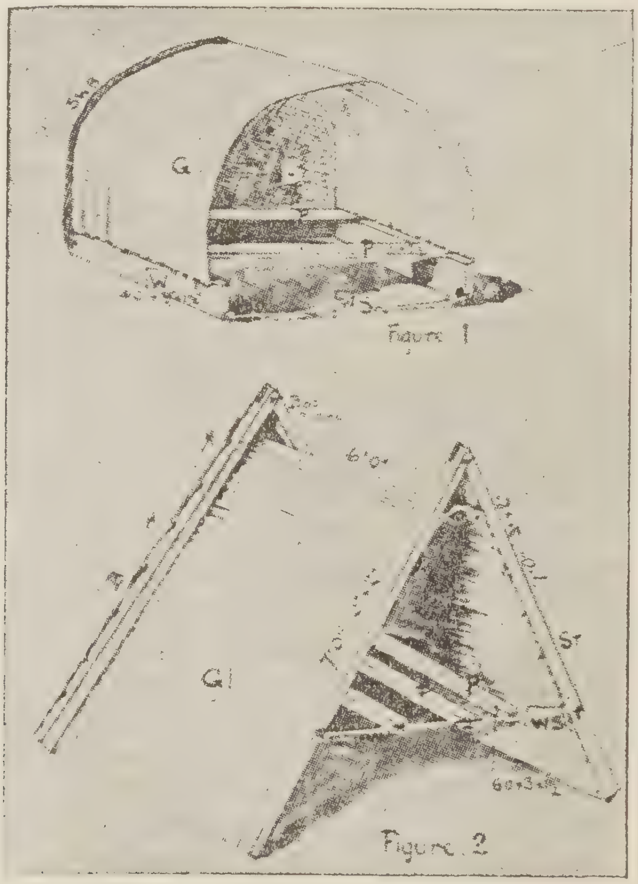
No poultry-keeper should ever forget this word, for it is the secret of egg production, of physical perfection, and the best safeguard against disease. Under no circumstances should one attempt the management of an egg farm without supplying scratching quarters (preferably the shed plan), then keep the flocks busy, and he will be richly rewarded with great qualities of "hen fruit."—*Farm, Field, and Fireside.*

POULTRY-HOUSES.

The illustrations of poultry-houses combine the five qualities most essential to poultry-keepers—that is, they are cheap, simple in structure, vermin proof, movable, and healthy.

The following are the details of material used :—

House 1 (for 6 or 8 birds) is made from the following material:—Two sheets 26-gauge galvanised iron, curved half round, two pieces 4 feet 9-inch by $1\frac{1}{2}$-inch jarrah, to be coated with tar, two pieces 4 feet 3-inch by $1\frac{1}{2}$-inch stringy bark, for perches, about 14 feet wire, some sacking, nails, and four screw staples. First the two pieces of iron (G) are riveted together, side by side ; next screw or nail the iron (W) to the 9-inch by $1\frac{1}{2}$-inch jarrah on the outside, 3 inches from the top. The iron is then to be nailed to the other 9-inch by $1\frac{1}{2}$-inch jarrah board (W) ; for convenience in nailing, place a strut



MR. PITMAN'S POULTRY-HOUSES.—New Designs

between the two boards, moving it along to hammer against ; this done, wire the house together at the front by (see WS sketch) hooks to the staples (removable). The back (B) is made of sacking, and is wired at the edge ; this is hooked over (SWB) the first groove in the iron, and fastened by staples, and is removable to renew or clean. Perches (P) 3 inches by $1\frac{1}{2}$ inches. (SB) are nailed in their place. Cost of material about 7s. 6d.

House 2, for 18 or 20 birds, six sheets 6 feet 26-gauge galvanised iron, four lengths 7 feet 3-inch by 2-inch stringy-bark for standards, three lengths 6 feet 3-inch by $1\frac{1}{2}$-inch stringy bark for perches, galvanised iron (or other) wire, sacking, screw staples, nails, and two $\frac{3}{8}$-inch bolts. The two standards (ST) are cut as shown in the drawing, and bolted together (or wired); they are kept open by a stay (temporary), while the six sheets of iron (G) are being nailed to the inside. The two pieces coming together at the top are bent, one overlapping the other; a wire stay (WS) is fastened to the two standards on each side, and to this the three perches (P) 3-inch by $1\frac{1}{2}$-inch (SB) are nailed, the nails being hammered in and then bent over the wire. The back (B) is made of a piece of sacking, with hooks on (H). Wire staples are nailed to the standards for the back to hook on. The cost of the material is 17s. 6d.—*Reprinted by permission of the Proprietor of the* "*Garden and Field*" *from May number*, 1900.

EXPERIMENTS IN CHICKEN-RAISING.

The New York Agricultural Experimental Station has been making exhaustive experiments to test the relative values of cereal and meat foods for chickens and ducklings. In the series of experiments ten lots of chicks were fed for twelve weeks, and two lots of laying hens for six months, and two lots of ducklings for ten weeks. The experimental feeding began with the chicks and ducklings when they were a week old. Columns of figures have been published showing the cost of foods, the daily increase in the weights of the various lots. The conclusions arrived at were that for laying hens a greater weight of animal food was consumed than when vegetables only were used, and despite the higher cost of the meat ration, the increase in the egg supply was so marked as to place the meat ration beyond the region of doubt as to its superiority and profitableness. In the experiment with ducklings, of the lot fed with the vegetable ration one-half of them died before the end of the fourth week. Of the lot fed on meat none died, and at the end of ten weeks they weighed an average of 5 lb. each, as against $3\frac{1}{2}$ lb., the weight of those fed on the vegetable diet. The conclusion arrived at in every case in regard to chickens was that those fed with a large proportion of meat were healthier, grew quicker, and attained marketable size at an earlier age and at a cheaper rate than those fed on grain food only; while for ducklings, the meat-fed birds weighed 2 lb. each three weeks sooner than the others, they weighed 3 lb. each four and a-half weeks sooner, and the average weight of 5 lb. each was attained by lot A (meat-fed) when lot B (grain-fed) averaged but little over 3 lb. in weight. The chief advantage of animal food ration was in the much more rapid growth and early maturity, and not so much the ultimate attainment of greater size.

FEEDING YOUNG DUCKS.

Ducks, like all others of the domestic feathered tribe, require extra care when young. A good feed for the young ducklings at first is stale bread soaked in sweet milk, together with any kind of table scraps, as cooked potatoes, oatmeal porridge. Feed them all they will eat up clean every three or four hours for several days in this way, and after they are a week old they will need feeding only three or four times a day. Feed a mixture of cornmeal, crushed oats, and middlings, moistened with milk, in any form after the first week until ten weeks old, when they will be feathered. The three kinds of meal need not be mixed together; any two of them will do, and the corn should be increased the last week if the ducklings are intended for market. Keep clean, fresh

water constantly before them, arranged so that they cannot do more than put their heads into it. This can easily be done by driving sticks close together about the dish containing the water. The water should be placed in the shade and changed often in hot weather to keep it cool and fresh. This is very important. Ducklings should on no account be allowed to get to any water beyond what they drink. Preference should be given to confine ducklings to a well-shaded grass run, by using foot-wide boards or poultry-netting, and moving them whenever the run becomes soiled, if it is not large enough to keep clean. Besides the food and water, place a shallow box of sand where they can at all times get at it. Sand is by some put into the soft food. Never feed ducklings whole grain, and when it is fed to old ducks put it into water. The old ducks will do very well if they can get to water, but it is not at all necessary that there should be water in order to be successful with ducks. This is especially true of the Pekins, the greatest of market ducks.—*Scottish Farmer.*

A CURE FOR EGG-EATING.

Hens, when kept in confined areas, are likely to contract quite a number of troublesome habits—among others the annoying trick of eating their own eggs, and the nasty habit of pulling one another's feathers. As a preventive of egg-eating, many cures have been recommended from time to time. A most effective cure is that of filling a number of egg-shells with a mixture of soft soap and carbolic acid, and placing these in the nest most frequented by the offending birds. After dosing themselves with two or three eggs so treated, the birds will subsequently be found very chary of attacking even natural eggs.

REARING YOUNG CHICKENS.

Although the climate of Queensland permits us to rear chickens with far less trouble and care than are required in colder countries, yet a considerable amount of attention is necessary, especially in connection with their food. The building up of fine healthy birds depends almost entirely on the young chickens being provided with food adapted to stimulating their growth, and so ensuring early maturity. Locality also has much to do with success. Fowlhouses exposed to cold westerly winds, or to south-easterly rains, with cold damp floors are fatal to older birds, so it may be imagined what the effects of such exposure may be on tender chickens. On their points a writer in the *Agricultural Gazette*, London, says :—

So far as the rearing of early chickens is concerned, it is desirable to realise what are our difficulties and limitations. For instance, there are places eminently suitable for ducklings which are altogether unsuitable for chickens, and *vice versâ*. There are places which could be used for goslings which would be altogether unsuitable for turkeys. Anyone, therefore, going into this business should try to learn what are the special local conditions, with a view to selecting that branch of poultry-keeping which is most likely to succeed. But primary importance must be given to the nature of the soil. In cold damp places, or upon very heavy land, it would be unwise to attempt chicken-rearing very early in the season. The same is also true in woods, which are most valuable in summer by reason of the shelter they afford, but in autumn and winter are usually very damp. Hence, for early chickens we want a dry open space, sheltered as much naturally on the east and north as possible, but open to the south and west, so that they may get all the sunshine that is to be secured. Of course such a place is usually very exposed to wind, and here it is necessary to

remember that advice suitable to one part of the country may be unsuitable to another. In the south and west counties the chief winds are from the south-west, whereas in the north and east the most troublesome winds are from the north-east, hence natural shelter should be secured as far as possible on the side where the greatest amount of danger is to be expected. We cannot forget that for young life it is absolutely essential that they shall be happy and comfortable, and if the front of the coop or brooder is exposed to the full blast of the wind we can scarcely anticipate that the birds will thrive. Hence every poultry-keeper must understand this matter for himself or herself.

A very important point is the feeding of young chickens, and it is necessary to see that the food if cooked is properly cooked. My reason for mentioning this is that some time ago I found a lot of chickens dying off, and from no apparent cause; they were perfectly healthy at one time, and within three or four hours were dead. On inquiry into the matter, it became evident that they had been fed upon food excellent in itself if properly prepared. For instance, rice had been given to them very little more than mixed with hot water, slightly softened on the outside, but in an indigestible form, and the result was that this swelling in the crop had killed the young birds, whose digestive organs were incapable of assimilating it in this condition. Oatmeal had been given, very excellent in itself, and when the birds are a little bit older it may be used dry, but at an early stage this is inadvisable. Here, again, it was slightly moistened with water, whereas it ought to be thoroughly mixed and steeped—boiled if possible. A third instance was seen in the use of Spratt's meal, and of this the same can be said as in the case of the rice and oatmeal. Thus it is necessary always to keep in view that the food must be thoroughly prepared, especially for the younger birds. Rice, for instance, is useless for them unless it is quite soft, oatmeal is too dry, and Spratt's meal would swell with the moisture found in the body. When the chickens received the foods above named properly prepared, then they were all right and mortality was at once stopped.

It has been claimed that chickens can be reared upon dry food without any steeping at all, and there is no doubt that this is true. We could rear chickens from the first two or three days upon seeds and corn of suitable kinds, and it is quite probable that in many cases they would be even more vigorous than those brought up under other conditions; but we must bear in mind that the object of giving soft food is to stimulate growth and ensure more early maturity, and it is not too much to say that it is chiefly due to the softer foods, the prepared foods, if I may use the term, that the earlier growth and rapid development of all races of stock are due. If we could take out of our young birds those that are to be kept as breeders or laying stock, it would undoubtedly be wiser to feed them in the manner just indicated, and in this case the slower growth would be no disadvantage, probably a gain; but, of course, it is impossible to do so, and we must select them later on. I have never carried out any practical experiments in this way, but, from what has been done elsewhere, it is probable that it would take several weeks longer to grow the chickens to the same size upon hard corn than upon soft foods.

One point more may be mentioned here—namely, the importance of looking properly after the young chickens at the time that the hen deserts them. This is of less moment later on in the year when the weather is very warm, but in the early months of the season there is greater danger of the birds going back. The want of natural protection and the loss of the oversight of the mother, the birds being thrown upon their own responsibility, may have serious results unless the poultry-keeper looks well after them. They should at once be removed to a good roomy house, and, if possible, to the companionship of some chickens a little older than themselves, and it is surprising what this does in the way of reconciling them to the loss of their natural protector, and the fresh conditions as well as, I suppose, the new instincts that arise in them, make them quite content. Once get them past the first few days, and they will be right for the future.

The Orchard.

BEES AND BLOSSOMS.

To those who entertain the belief that bees are injurious to fruit blossoms, we would suggest a careful perusal of a paper on "Bees and Orange Blossoms," by Mr. H. Tryon, Entomologist, published in this *Journal* (1st January, 1898), which is convincing to the contrary. Our own personal experience has been that the bee is not to be charged with the crime of damaging orchard blossoms or fruit. So far from injuring the blossoms, the bee plays a very important part in fertilising them, and this has been most precisely shown by experiments carried out by Professor A. J. Cook in the United States last year. From the results of his experiments he was definitely able to state that fruitgrowers and farmers are deeply indebted to the bee for the fruitfulness and reproductive power of their crops.

Professor Cook selected a certain number of blooms on different trees. Some of these blossoms were covered with cheesecloth, and an equal number was left exposed, allowing the bees to have free access to them. The same was done with some heads of red and white clover. The results are here given:—

	Blooms.	Covered Fruits.	Uncovered Fruits.
Apple	40	0	15
Crabapple	200	0	3
Pear	140	0	7
Cherry	300	9	119
Strawberries	60	9	27
Raspberries	184	93	169
	Heads.		
Clover, red	10	0	191
Clover, white	10	3	541

Another of his experiments consisted in taking two trees each of plum, cherry, and pear. On each tree three lots of blossom were selected. One lot was left uncovered, the second lot was covered (but bees were introduced under the covering), and the third lot was covered, excluding all bees. In no single case was there a single fruit on the branch from which the bees were excluded. The following were the actual results:—

	Covered.	Bees Enclosed.	Not Covered.
Plums	0	3	8
	0	5	4
Cherry	0	5	6
Pears	0	6	8
	0	8	1

ARE BIRDS OUR FRIENDS OR FOES?

The Tremont correspondent of the *Dixon Tribune* says:—"Wild birds of all kinds did much damage among the cherries raised in our orchards. And yet there are cranks editing papers who are continually sending out pleas for the poor little birds, and advocating the bringing of more varieties of the pest into the country. Verily the ways of the people are curious."

A professor of Leland Stanford, Junr., University happened to be in the exchange room of *California Fruitgrower* when the clipping was made, and the Tremont man's views were read to him. The comment by the professor was:

Plate XXXI.

MOVING LARGE MANGO TREES.

"That man is densely ignorant, or a fool, or both. Nearly all birds are friends of the horticulturist, and he should know it by this time. The linnet is the one great exception. It should be killed on sight. If a bird helps itself to a little fruit, what of it? It can only do this during a very brief season, three or four weeks at most, and during the rest of the year it is helping the farmer and orchardist by killing noxious weed seeds and insect pests, and these, were it not for the birds, would overrun everything, making successful orcharding next to impossible. A singular fact is that birds every time prefer wild to cultivated fruits. A remedy then suggests itself. In every orchard there should be a few wild fruit-producing bushes and trees for the especial benefit of man's friends and aids, the birds. Another remarkable fact is that birds invariably leave beneficial insects alone."

These are the words of a professor of botany and other kindred sciences, but they are apt to not startle the Tremont correspondent. His erroneous belief is deeply rooted, or we believe it to be, for periodically he makes a similar and equally reckless statement of opinion. We do not know of any horticultural editor who is "continually sending out pleas for the poor little birds"—not one. We, however, know of many who favour birds in the interest of the poor farmer and the poor orchardist. It is in that direction, and not towards the birds, that editorial sentiment is expressed. Further, we know of no editor of a horticultural journal who advocates "the bringing of more varieties of the pest into the country." On the contrary, every horticultural editor advocates the keeping of foreign birds out of the United States, and this for good and sufficient reasons. As an illustration, we would refer the Tremont correspondent to the agitation by scientists and horticultural editors against the proposed importation of the khol-meise which occurred about two years ago.—*California Fruitgrower.*

THINNING OF FRUITS.

Professor Van Deman, in "Vick's Magazine" (says the *Pacific Rural Press*), calls attention to the neglect of many otherwise intelligent fruitgrowers, to thin their heavily laden trees or vines. He says: "There is nothing lost by pulling off one-half or three-fourths of a big crop of fruit. It may look like waste, but what is left will grow to almost the same weight as the whole amount, and it will be larger, of better quality, and worth much more. Peaches, apples, and pears should be thinned to not less than 6 inches apart; plums to about half that distance. Fruit grown this way is a delight to see and eat, while the small stuff grown on a crowded tree or vine is often of a little value."

TRANSPLANTING LARGE MANGO-TREES.

Most men have their own particular way of removing and replanting trees of large dimensions, but to those who have not essayed the task this appears a big job to tackle. It is for such persons these remarks are intended. The writer makes no pretensions to a special knowledge of the subject, but having successfully removed and replanted a number of large-sized mango-trees, the method adopted is here given for what it is worth.

Of course, there is a great deal to be taken into consideration to insure success, especially if it be intended that the tree shall retain its foliage. If this is not a consideration, the top may be cut back, and the labour of removing considerably lessened; and thus the risk of losing the tree reduced to a minimum. If the tree is taken from a warm friable soil, and from a secluded position, and replanted in a position having all these favourable conditions reversed, success cannot be expected. If the soil is the only thing that is likely to militate against success, the unsuitable soil may be taken out and good soil be substituted for the reception of the tree. If the tree is removed from where it enjoyed all the moisture it required, and is placed in a dry

position, and then neglected, total or partial failure will result. If the last condition is reversed, success is certain. Granted that these, and many other little matters which generally appeal to common reason, are carefully thought out beforehand, the work, instead of being a trouble, will proceed with a fascinating pleasure, and, having succeeded, the man is justly proud of his accomplishment.

A strong box, measuring 30 inches square by 20 inches deep inside measurement, will do for trees having a height of from 8 to 12 feet and a corresponding diameter measure through the top ; 10-inch by 1-inch pine boards will do for the sides and ends. The ends of the box will be exactly 30 inches long ; the sides will measure just 38 inches long. You will want eight pieces of 3 x 2 hardwood, 20 inches long ; two for each corner. The ends of the box must be nailed on to the edge of the hardwood pieces ; the sides to the hardwood on their flat, and all flush with the pine. You will observe the ends of the box are nailed to the hardwood on their edges ; this brings the thickness to 4 inches at each end, so that, when the ends are put in, this takes up the 8 inches allowed on the sides, making inside measure 30 inches square, and outside 38 inches by 32 inches, with the four corners bolted together on the outside. Having made the sides and ends, stand the two sides up—the hardwood outside—and put in the ends, hardwood outside. This brings all the hardwood pieces flat together, with 1 inch thickness of pine between them. Now cramp the corners together on an even floor, and bore $\frac{3}{8}$-holes 5 inches from the top and 5 inches from the bottom, and bolt together ; $5\frac{1}{2}$ inches by $\frac{3}{8}$-inch bolts will do nicely. When you are nailing the pine to the hardwood, avoid driving nails where the bolt-holes will be, and be sure not to split the hardwood with the nails. Now you have a box without top or bottom as yet. These will be mentioned later on. You need not bolt one end in, as this will have to be done after it is placed around the tree to be taken up.

How the Tree is Taken up.—Place the three sides of the box round the tree, and bolt in the end. See that it is all tightly screwed up, and square it so that the trunk of the tree is in the middle. Now proceed to cut away the soil all round the outside of the box, and, as every 3 or 4 inches are removed, drive down the box with a wooden maul, striking on the hardwood corners. A little judgment will be necessary, as the sole object is to get a solid cube of unbroken soil compressed inside the box. Should you encounter stones that will be in the way of the box going down, they must be carefully taken out. As soon as you uncover a root, cut it clean through with a chisel and mallet, so that the bottom edge of the box does not grind on it as it goes down. If you sever the roots as soon as they are visible, and without removing any more soil, there is a firm bottom to cut on, and less injury will be done to the roots and cube inside the box. Continue cutting away the soil, and driving down the box till it is down level with the surface. (If the soil has been banked up around the tree, it should be removed and made level before the box is placed in position. Even then it may be found necessary to sink the box below the surface to get in all the side roots, but not to the detriment of the surface roots.) You may now nail on the cover, from which it will be necessary to cut out two half-circles to fit the trunk in. Pack some grass or bagging tight between the edge of the boards and the trunk to act as a fender to prevent injury to the bark. Having put on the cover, you may excavate 1 foot deeper all round the box, giving yourself plenty of room and keeping the loose soil well out of your way. Now undermine the box on whichever side you intend to let the tree down (for the tree and box must come down on its side so that the bottom may be nailed on). While you are undermining the box, and before you attempt to let down the tree, see that all the tap-roots are carefully cut through; for if any are left uncut when the tree comes down, they will pull the cube partly through the bottom of the box. This precaution will prevent unnecessary forms of speech and much waste of time.

It will be just as well to prop up the front of the cube to prevent the tree coming down unexpectedly. Of course, you will see the necessity of clearing away plenty of soil to allow the top of the tree to fall into a hollow space. If this is not done the tree, when down, will lie at an angle which will make it very awkward to trim off the soil and roots. We will suppose the tree, with the cube inside the box, is now lying on its broad side. Then proceed to cut away all the soil that is protruding beyond the bottom edges of the box. Cut the soil off nicely square across, and then whatever roots there are can be sawn off level with the soil. The bottom may now be nailed on and the tree upended.

If the sun is hot it soon suffers while lying down, for the under surfaces of the leaves are tender and quickly scald. Hence the necessity of getting the tree upright again as expeditiously as possible. Before beginning operations, it will be as well to have a look round to see how near you can get to the tree and which position will be best for getting it into the dray. You will want strong hardwood skids—4 inches by 4 inches by 18 feet long will do. The ends of these may be placed under the box before the tree is upended, with the other ends of the skids resting about 18 inches on the dray; if a roller is placed on the bottom of the dray at the ends of the skids, it will land the box well forward with little effort.

The dray must be well propped up fore and aft, and the wheels can be let down into the soil to reduce the incline. If the ruts are dug out the shape of the wheels, it will keep all steady. The soil can be cut away from the front of the wheels when you are ready to start away with the tree. Greasing the skids will help considerably. All lever movements must be made with great steadiness and precaution, especially when the tree is about midway on the skids, for if too much play is allowed, and a gust of wind comes along at the same time, an accident may result. Pieces of 3 by 1 hardwood battens nailed on the bottom flush with the outside edges will keep the box nicely square on the skids while you are levering the tree into the dray, which to the uninitiated looks a dangerous job. These pieces of battens are just as useful to subsequently guide the tree down the skids off the dray.

To Plant the Tree.—Having placed the dray within about 15 feet of the spot where the tree is to be planted, put one end of each skid under the box, the other ends to reach the hole, but to one side of it; then slide the box gently down the skids till it reaches the ground. Now turn it over on its broad side with the bottom of the box presented to the hole it is to be planted in, with 2 or 3 inches hanging over. Prise the bottom off with the crowbar, and upend the tree. This requires small effort, as the top will about balance the box. The tree being now upright in its new home, you can take the nuts off the bolts, and prise the box asunder with the bar. Lift the pieces out, and fill in the hole round the tree. If, when you are prising the box apart, you see the cube of earth is likely to fall to pieces, remove one side only, fill in that side, then take out another, and fill that in till it is all done. If a number of trees are to be shifted, the top and bottom of the box should be bolted together instead of nailing. For this purpose use ½-inch iron rods screwed down 2 inches at each end with nuts and washers to fit. The rods will need to be 24 inches long. The bottom, in this case, should be hardwood, and the battens before mentioned can be permanently fixed on the outside boards. Whether the top and bottom are nailed or bolted on, it will be necessary to cut the boards longer than the width of the box to allow for any bulging that may possibly occur. If bolts are to be used, the holes should be slotted quite 1 inch long. Now, as the top and bottom cannot be put on at the same time, it will be best to screw on the top, temporarily putting the screws between the slots. The total cost of taking up and replanting a tree such as shown on the dray (box included), amounted to £2. One man succeeded in doing all the work of the tree on the dray without any help whatever.

[A precisely similar interesting process is adopted in Paris, where very large trees are often transplanted. The French foresters think nothing of transplanting trees 20 to 30 feet high with a corresponding diameter.—Ed. *Q.A.J.*]

GRAFTING THE MANGO.

The following was inadvertently omitted by Mr. Knight, in his paper on grafting the mango (Part I.) published in the July issue of this *Journal*:—

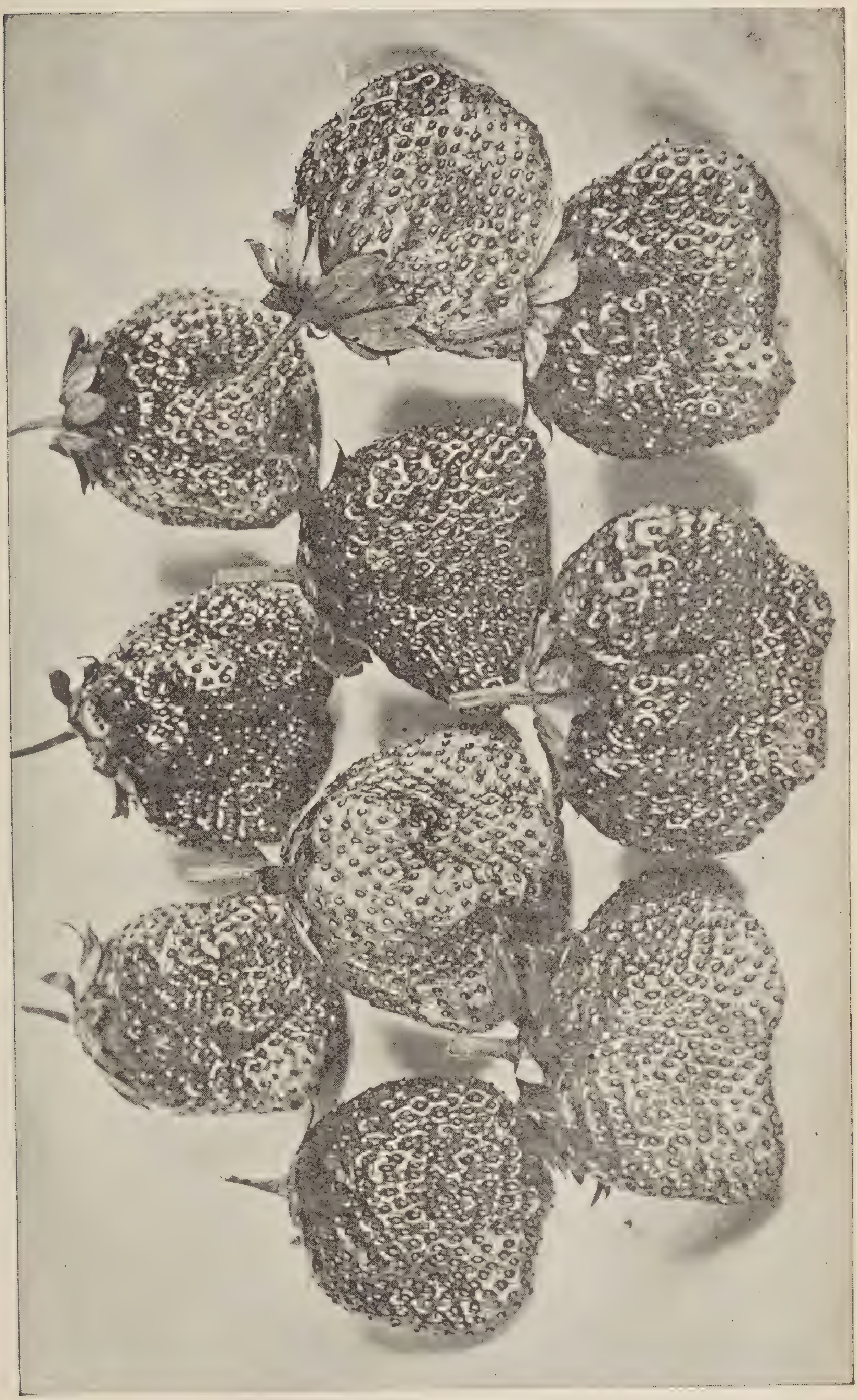
When the young shoots which have sprung from the grafts have ripened, the old wood projecting beyond the graft should be sawn off close at the base of the new growth, as shown in the diagram. As the new wood continues to grow, it will cover up the entire end where it was sawn off, making very neat work of it. In the mango the term a "ripened" shoot applies when the leaves and bark of the latter have taken their full green colour (chlorophyll), or when the shoot has rested and is ready to continue its growth.

In a matured growth the green colouring matter has been succeeded by a brown colour which varies considerably with age.

STRAWBERRY-GROWING AT MOOLOOLAH.

We drew attention last May to a new strawberry grown by Mr. A. Court, at Mooloolah, which was pronounced by the Government Fruit Expert, Mr. Benson, to be a most valuable fruit. It comes in some two months earlier than the Marguerite, Hautbois, or any other strawberry. Mr. Benson's opinion was that if the fruit were sent to Sydney at that time of the year it would command a high price—up to 6s. per quart. Mr. Court sent some down, and it realised 7s. 6d. per quart. Since then 1,800 quarts have been up to the present (9th August) gathered from half-an-acre. It has been decided to name this new variety "The Aurie," and it well deserves the title from its rich appearance. In flavour it is unsurpassed by any strawberry we have yet tasted. A committee of Brisbane ladies (and ladies are good judges of strawberries) discussed the merits of three varieties sent us by Mr. Court. They were the "Marguerite," the "Federation," and the "Aurie." "Federation" is a very large berry, an exaggerated "Hautbois" as to colour and shape, but it has not the flavour of the Aurie or the Marguerite. The light colour of its flesh does not recommend it as a fruit for jam purposes, as it would require to be coloured with cochineal or beet-root to give it the rich strawberry colour demanded by the trade. The Marguerites were beautifully shaped, of brilliant colour, and exquisite flavour; still the consensus of opinion was that the Aurie was far better as a dessert fruit and for jam-making than any strawberry yet placed on the market. As the fruit ripens as early as May, Mr. Court has a little goldmine in his plantation, and will always be able to command very high prices in the southern markets, as no strawberries make their appearance there till July or August. Our illustration is from a photograph supplied by Mr. Court, who adds that it has now fruited three years. He is so well pleased with it that he has named it after his daughter Aurie. It is very productive. This season it has yielded from about half-an-acre—June, 280 quarts; July, 1,280 quarts; up to 16th August, 1,234 quarts; or a total of 2,794 quarts of dessert fruit. The first quart was picked 30th May. All the fruit has been sent to Sydney and Melbourne, and sold at high prices. The fruit is of a very glossy, red colour, and looks very handsome when seen growing out from the green, healthy foliage, looking almost like garnets in the sunshine; while the plant itself is so robust and healthy that it is a pleasure to work among the crop. It is a strong plant with an abundance of long roots, which penetrate the soil deeper than most varieties, enabling it to withstand the drought remarkably well. The fruit, from a preserving point of view, ranks among the very best. All experienced growers will, by the above figures and dates, understand the great value of this variety, as by growing early fruit and late they would be able to get along with a more even amount of help, and, owing to the longer season, the helpers get better trained to their work. For healthy, vigorous growth, productiveness, size, beauty, and quality, the Aurie promises to be a remarkable variety. The photo. was taken from fruits picked 14th July; sent to Brisbane and photoed on the 17th (natural size).

Plate XXXII.



THE AURIE. (Natural Size.)

Viticulture.

FROST PREVENTION.

By E. H. RAINFORD,
Viticultural Expert.

The time is approaching which brings the most serious danger to the vine for the whole year—*i.e.*, the danger of spring frosts, which destroy in a few hours the young vegetation and coming crop, as happened last October all over the Downs. The danger is a very serious one, and well worthy of being provided against, as, if the frost is severe, the destruction is complete; not only has all hope of a crop to be abandoned, but frequently the vine will be mutilated with dead wood to such an extent as to require its complete re-formation. The great frost of last October proved very destructive to the vines at the Westbrook Experimental Farm, many being killed down to the ground, and a larger number having the young wood killed. The result was a copious growth of suckers from below ground, which necessitated much labour to remove them, as others grew as fast as they were taken off, and at least 30 per cent. of the vines had to be re-formed on a sucker, which throws the vine back and also destroys the symmetry of the vineyard. Of course no crop was secured, and in all probability the havoc done to the vines at Westbrook was experienced in many other vineyards, so that vignerons would do well to prepare for a possible repetition of last season's frost. An illustration is given of the effect of the frost on one or two vines at the Westbrook Farm.

There are two ways of preventing the young shoots from being affected by frost. One is to protect them with mechanical appliances, and the other is to protect them with smoke. The first-named is easier, more certain, but more costly, and consequently can only be considered in cases of small vineyards or a few vines for household purposes. The appliances used are sheetings and mattings of various materials stretched over the vines on frames, and they should be placed in position in the evening and removed in the morning when frost is threatening. Another good protector is to heavily mulch the soil beneath the vines with old straw, hay, cornstalks, or similar material; this prevents the radiation of heat from the soil and consequent lowering of the temperature. But these systems entail expense and loss of time in applying them, and, as observed above, can only be used on a small scale.

There remains the system of prevention by smoke, which is almost universally adopted in the larger vineyards in Europe. By interposing a stratum of smoke between the vines and the sky, great radiation of heat from the soil is prevented and the consequent lowering of the temperature to a dangerous point. This sounds easy of attainment, but is not so in fact, for the vigneron has not only to be alert to create his smoke at the right time, but he has also to arrange that the smoke shall not preserve his neighbour's vines while his own are being frosted. Some have an idea that the damage is caused by the subsequent thawing of the frosted vines by the sun, and that if the sun could be kept off the vines the shoots would not be injured. This view is quite erroneous. The freezing of the cells in the green parts of a plant causes them to expand and burst. From that moment the affected part is dead, and, sun or no sun, will never come to life again. If, therefore, the experiment of shading frosted vines from the sun has succeeded, it was due to the simple fact that the cells had not been killed.

Now with regard to the time to apply the remedy. It is generally recognised that about daybreak is the most dangerous period for the vines, although very frequently the damage has been done earlier. From 3 a.m. to sunrise may be looked upon as the critical period. It is obvious that, unless there is command of an unlimited supply of fuel, the fires must be lighted just before the above-mentioned time, and there the difficulty comes in, as few have the steadfastness to get up at that hour in cold frosty weather every time danger is threatening. It is done once or twice, but generally given up on the very night supervision is most needed. Even if a large supply of fuel is obtainable and the fires be lighted early, the vigneron must be up and on the watch, as, should the wind change a few points during the night, the neighbour gets the benefit of the smoke, and the protected vines are frosted. It therefore comes to this: That if the vineyard is to be insured againt damage, the vigneron must, on those nights when frost is threatening, be on the alert all night or set an alarum to the early hours and get up.

Next comes the choice of materials. What is required is something that will make a good cloud of smoke and yet burn slowly. Such materials as tar-barrels, &c., make plenty of smoke, but burn too quickly, and would be likely to pass out just at the time they were most required unless a large supply were at hand. The material which has given most satisfaction is damp straw, half-dried weeds, &c., heaped upon a foundation of burning logs or brushwood. It makes a big smoke, burns slowly, and is very inexpensive. All the litter of straw stacks, the harrowings of cultivation paddocks, corn stems, and similar rubbish will come in admirably for the purpose, and be the better for being got rid of. The materials, if dry, should be well damped and laid in heaps on the headlands round the vineyard, not too close together—a few chains apart will be sufficient if the heaps are of fair size. If the bush is alongside the vineyard some fires could be kept going permanently for the fortnight the danger threatens, but, of course, they would only be of use when the breeze is from that quarter, and must not be relied on.

[In reference to last month's article, and to illustrate the serious effects of anthracnose or black spot on certain vines a photo. is here reproduced of some canes attacked by the disease last season.]

POLISHING RICE.

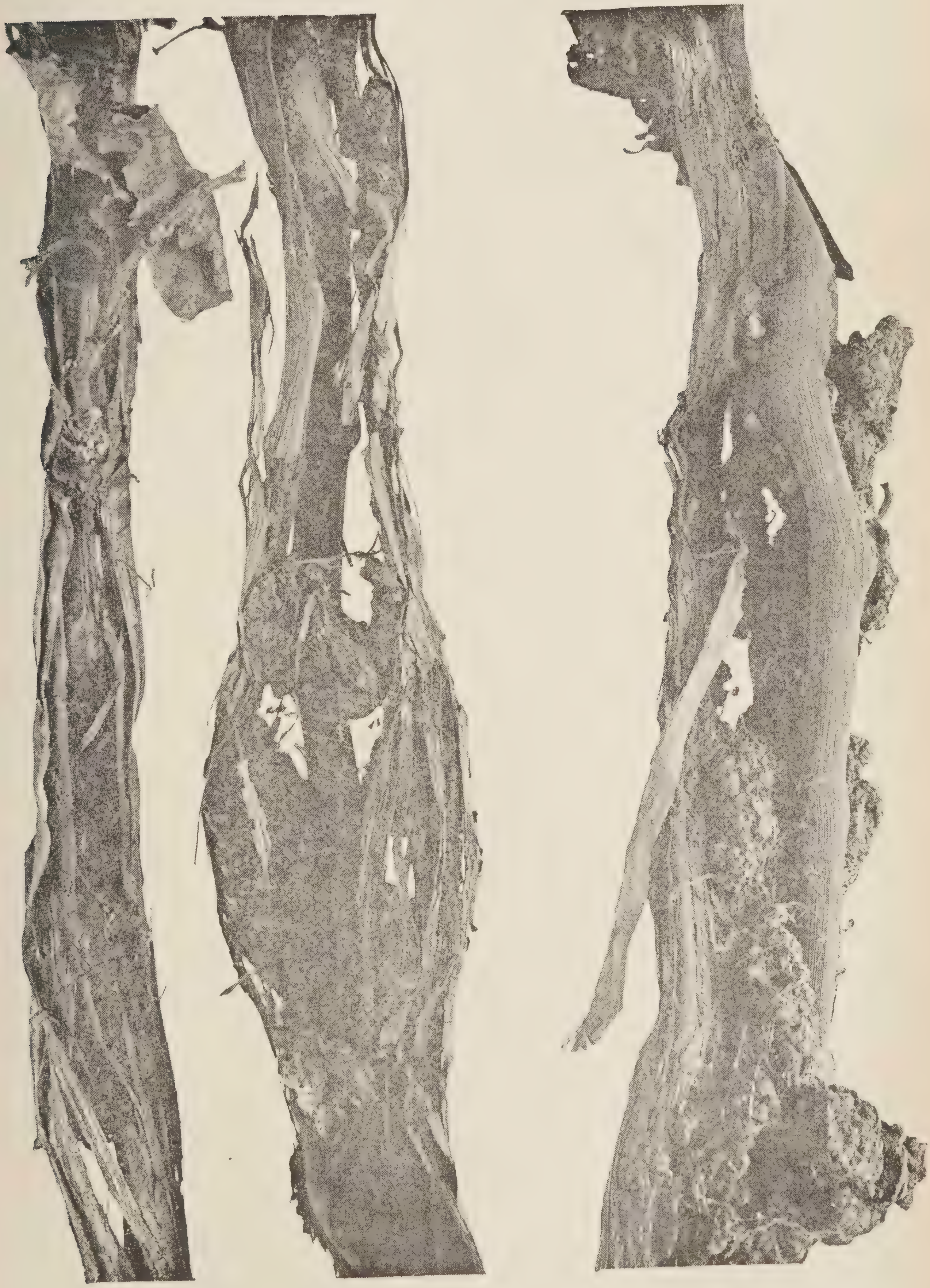
There is a great deal in the style in which any product of the soil or manufactured article of food is got up for market. Coffee, rice, arrowroot, honey, ginger, preserves, and many other articles produced and manufactured in Queensland, have often suffered in competitive markets in consequence of being either carelessly prepared or badly packed, or put up in unsightly vessels and packets. The *Grocer*, an authority on such matters, says that fashion demands a bright lustre in rice, and this is secured by rubbing off a dull outer coating of the grain, which has been shown to have a food value nearly twice as great as the rice grain after polishing. The polishing process, however, greatly improves the appearance of the grain, and it is now almost universally practised in cases where the rice is intended for occidental markets. The material scoured off is preserved and sold under the name of rice flour.

The polishing is effected by friction against the rice of pieces of moose hide or sheepskin, tanned and worked to a wonderful degree of softness, loosely tacked around a double revolving cylinder of wood and wire gauze. From the polishers the rice goes to the separating screens, composed of different sizes of gauze, where it is divided into its appropriate grades. The rice is then packed in barrels or sacks and is ready for the market.

Plate XXXIII.

Vines Attacked by Anthracnose or Black Spot.

Plate XXXIV.



Effect of the Frost of October, 1899, on the Vines at Westbrook State Farm.

Plate XXXV.

Sarcostemma australe, R.Br.

Botany.

PLANTS REPUTED POISONOUS TO STOCK.

BY F. MANSON BAILEY, F.L.S.,
Colonial Botanist.

SARCOSTEMMA AUSTRALE, R.Br.; OR, CAUSTIC VINE.

This is a leafless fleshy climber, with a copious flow of milky sap; the stems are cylindrical and jointed; the flowers small in clusters at the joints of the stem; seed pods (follicles) 1 to 2 inches long; seeds with a silky tuft of white hairs at one end.

It is said that the effect of this plant on stock is worse than that of the Caustic Creeper (*Euphorbia Drummondi*). Some years ago a large number of cattle, chiefly fats, perished in the Warrego district from eating this plant; and since then the plant has been frequently blamed for the death of stock in various parts of the colony.

EXPLANATION OF PLATE.

A. Two views of bud.
A1. Front and back views of expanded flowers.
G. Male and female organs in position.
H3. Pollen masses.
H5. Corona.
I. Pistil.
I1. Ovary.
I2. Stigma.
O. Seed with tuft of hairs (Coma).
O2. Coma-hair.

DESTRUCTION OF MOTHS.

At Aigle (Switzerland) little boys armed with glued rackets go at dusk into the vineyards and catch the night moths, the eggs of which would produce the devouring worms which cause there such havoc amongst the grape-vine leaves (*Chochylis*). This new way of hunting was quite successful. In a few days, and on a few acres only, over 20,000 moths were caught, representing millions of eggs and worms.

[We believe that the experiment of catching fruit flies by means of butterfly nets was tried with good results by Mr. C. S. Voller. How would the sticky racket answer, fixed to a long handle?—Ed. *Q.A.J.*]

Apiculture.

GIVING SUPER ROOM.

In many early districts—that is, in those parts of the country where bees are forward and have been helped on by early orchard bloom—there will most probably be a great deal of swarming. Super room has been given above or frames below, but if the former they will have been neglected owing to the cold honeyless days that have prevailed for some time. Directly we shall have an outburst of fine and probably tropical weather. At the same time the bees, by swarming right and left, will make things merry for their owners.

"What shall we do now?" will be the question passing through the mind or ejaculated by many a beekeeper. There is one course if the stock has got too much ahead. Change every lot to a fresh hive, and put on a super if not supering it afresh. The object of all this work will be to cut out queen cells, remove combs clogged with honey, or old combs that are fit only for the wax-pot, and then fill up with fresh frames. Such a drastic operation will, I feel sure, settle matters, and cause the bees to give up all idea of swarming for the rest of the season, and turn, as they should, all their power upon the storing of honey in the chambers above.

If a novice buy a beehive he will get one super. That will be sufficient for a swarm that is to stock a new hive, but it is absurd to have only one for a stock when it is well known that one good stock may require three or more crates during the few weeks the flow of honey lasts.

If more than one super is provided for each hive, do not let the bees fill one and then give the other, but pile all they need one above the other, even if they are three or four high. One more point must be noticed. The bees

always fill and seal the top cells first, so they do the top crate; therefore, if we give the extra crates above the first we are reversing the proper order of things. The first must not be quite completed; in fact, it is better only half full, when a second is placed underneath it. In this way always proceed as long as more super room is needed.

The new honey will be stored and ripened in the new combs in the lower supers, and then carried to complete the combs above. While, too, the honey remains directly over the brood chamber, it is kept in the best place for thorough ripening.

A NON-SWARMING HIVE.

The hive here shown is, in appearance, the well-known "W.B.C." hive, but it is not. It is the "twentieth century non-swarming" hive with features claimed by Mr. E. H. Taylor.

The parts are, first, the floorboard, and here is the distinct feature: instead of being a plain board with slanting front or alighting board, it is a box in which arrangements are made for a set of frames. These frames, being below the brood frames, are to act as a swarm preventer.

The second part is the brood chamber, with an outer case as in the "W.B.C." The third part is a lift with a crate of sections shown as they would appear with the lift fitting closely upon the brood-chamber. The fourth part is lift No. 2, and the fifth or top part is the roof. The lifts are apparently only 4½ inches or 5 inches in depth. It would be much better to have an 11 inch and a 5 inch, or two of equal depth, so that space for two sets of shallow frames or three crates of sections would be provided.

The feature of the hive-frames below the brood-chamber is claimed by Mr. Taylor as his own idea, but several beekeepers have written upsetting his contention. The first, and, I believe, the best system of this kind is that introduced by Mr. Howard in his "Holme Wood" hive, but that has features that, while excellent in themselves, make it not the easiest for a novice to manage.

There is one fear I have about this "well" system of fixing frames below the brood combs, and that is that that part of the hive will become and remain damp. I have a hive on an almost similar principle in my apiary now, and that is the fault I have perceived. With a passage of air through, which occurs with the entrance at the bottom, all is well; but then we have honey stored in the brood combs instead of in the supers above by having a brood chamber 13 inches in depth—the depth of the shallow and brood frames.

There is, nevertheless, this to be said about the hive and the device: The latter will most certainly prove a safety-valve against swarming, and the dampness is only likely to occur in the driest part of the season; besides, the frames below will only be used for a short time, and while there is a danger of swarming.

THE HONEY-FLOW.

Use sections on swarms, and frames on stocks, and excluder zinc upon both. If swarms cannot be engaged upon sections, then try and prevent swarming when giving sectional supers to stocks by charging combs for foundation.

With the idea of ease in extricating, fix upon all shallow frames the new wide metal end. These supers are a magnificent sight, and are not only quickly filled, but the frames, or rather combs, are easily emptied of their honey.

All stocks that are approaching full strength have supers of shallow frames given to them, as they may build out the foundation into combs, which will be a most valuable possession when supering time comes round again.—*Farmer and Stockbreeder.*

PREPARING BEES FOR SPRING.

By H. R. STEPHENS,
Busy Bee Apiary, Toowoomba.

As the cold weather is nearly over, it will be necessary for beemen to think about getting their supplies for the new season, and of overhauling their hives to see that the queens are all right and a fair cluster of bees left to help with early brood rearing, and consequently to throw off early swarms. All hives and frames should be examined and clean boxes given to the bees, as those left on all the winter will probably have a considerable quantity of propolis and wax attached to the sides and frames. It is a good plan to keep the boxes well painted, and spring is a favourable time to start with everything fresh and clean. Any very old frames of combs should be melted down and replaced by sheets of foundation, as it is false economy to keep frames year after year with the idea of saving the cost of foundation.

If, on going through your hives, you come across some colonies that are weak, it is better to unite with another weak colony; but discretion must be exercised in this connection, as an apparently weak colony may, by having a prolific queen, become sufficiently strong to fill their supers and give good and early swarms. After examining the bees, and seeing that they have clean hives and good worker combs for the queen to lay in, the beekeeper can calculate how much he wishes to increase for the new season and get frames wired and foundation fixed so as to be ready for the first absconders. Also get supers for extracted and comb honey in time for the honey that, with good colonies and favourable weather, will soon be forthcoming. It would be as well for those who practise clipping the queen's wings to do this before supers are put in, of course, first making sure that she is laying well, and not mistaking the eggs of a fertile worker for those of a queen.

SPICED BEEF.

Spiced beef, which makes such an excellent luncheon dish, should form a *pièce de résistance* in every family. Spicing beef is one of the fine arts, and for those who do not understand the art we give the following recipe, which was supplied to the *Australian Field* by an expert:—

The beef should first be kept in pickle for about two days, and should then be wiped quite dry before adding the spice.

Mix together some allspice, coarse brown sugar, and a very little cinnamon, and then rub well into the beef on all sides.

Place on a big dish and keep it in a cool place, turning it every day, and rubbing in more of the spice.

Should the surface become at all dry, a little more pickle must be added, and the dish on which it stands should be changed every three days.

Continue this process for a fortnight, then wash in clean cold water, and place in a jar or tin only just large enough to contain it, with a very little cold water.

Then place in a large saucepan and boil fast for ten hours—this time for a joint of 10 lb., less time for smaller joints.

Allow it to cool in the jar, and on taking it out scrape off the outside, which will probably be black, and serve decorated with parsley.

Tropical Industries.

COFFEE NOTES.

RENOVATING.

One of the most profitable operations which can be carried on upon a coffee estate is that which goes by the name of "renovating"—that is, digging pits in amongst the coffee-trees. The making of these pits has been more or less a recognised part of coffee cultivation for many years, but the opinions of planters regarding their depth, situation, and efficacy have varied considerably. The sizes have ranged from 3 x 1 x 1 to 4 x 2 x 2, and their position from immediately above the coffee-tree to the farthest possible distance from it—*i.e.*, in the middle of every four trees. Whenever made, and of whatever depth, the trees have invariably benefited from them. In most cases, within a very short time—a few weeks, or even days—of the pits being made, a marked improvement is to be observed in the aspect of the trees, the foliage becoming of a darker colour, and the tree altogether assuming a more healthy appearance. As this takes place before there has been time for the cut roots to have thrown out any new fibrous roots, this cutting of the root has come to be considered the main cause of the good effects derived from the pits, and, on the principle that there cannot be too much of a good thing, some have come to the conclusion, that the more the roots are cut the better; and that, therefore, the closer the pits are to the trees, the greater will be the benefit derived from them. This idea receives some support from the actual fact that there is a greater immediate appearance of improvement when the pits are made close to the tree than when they are farther from it. But this is due to another cause, and might be produced without any pits at all. The immediate freshening up of the tree is owing to the fresh earth from the pit being heaped around about the stem, thus keeping the surface of the ground cool and moist, and calling into action those upper roots which, being near the surface of the ground, lie dormant during the dry weather. The effect is, in fact, the same as that which follows the opening of a road through coffee, when in a few days the trees on the lower side invariably improve in an almost incredible manner.

In the above instance, if it was the cutting of the roots which benefited the tree, it would be the trees on the upper side of the road which would improve; but this is never the case. The fact is, that the nearer the pit is to the tree, the more does the soil from it get spread over the roots, and the greater is the immediate effect. This effect is of very little value, being more in appearance than reality, and is afterwards more than counteracted by the damage done to the tree in the destruction of many of its main roots. Here again, to a superficial observer, the result seems (but only seems) to point the other way, for the tree continues to improve: and this very destruction of the large roots is held to be the cause. In truth, it is a great hindrance to the improvement which, from other causes, actually does take place in spite of it. A couple of years or so after the pits have been made, if one of them is opened it is found to be full of fibrous roots. Let these roots be traced, and it will be found that very few come from the mutilated main roots of the tree to which the pit belongs, while they swarm from the tree farthest from it; that while the mutilated main roots have sent out a few bunches of fibrous roots, the roots of the tree farthest from the pit have permeated it every direction: thus showing that the improvement to the tree is not due to the pit close to it, which has cut off the main roots, but to that farthest away, which has just pruned the ends of the small roots. The pruning of the small roots is of the

greatest advantage to the tree, as it causes numbers of fibrous roots to push out, but cutting off the main roots is analogus to cutting away primary branches—a course which is advocated by no one. The real good has been obtained by the light pruning of the roots on one side of the tree, and the good has been so great as to overcome the harm resulting from the heavy chopping on the other side. The proper place therefore, for the pit to be dug is where it will only cut the extremities of the roots; and this place is midway between four trees. A pit so placed will not produce any immediate alteration in the appearance of the tree, because most of the earth will get thrown out and evenly spread between the rows of coffee, instead of round the stem of the tree, consequently the surface roots will not be much covered; but in after years, when alone the full benefit from renovating must be looked for, the beneficial result will be much more complete than from a pit placed close to the tree.

The depth that has generally been found to answer best is 1 foot and 6 inches. The roots at that depth are out of harm's way, have a moist soil to work in, and are not exposed to the action of the slight January showers, which in the case of roots near the surface often stimulate the tree into early-blooming and consequent failure, the blossom being brought out and burnt off before any useful amount of rain has fallen. When renovating has been thoroughly done, the effects should last for years, and if a second renovating is even thought necessary, the only place in which the pit should be made is midway between the trees in the cross-rows at right angles to the pits first made, so that the pits form the four sides of a square around each tree. In any other position the result will be the digging out of the old pits; and the consequent frustration of the good previously done. By this it is not to be understood that the soil or roots are never to be disturbed again, but that such a thorough up-turning should not again be necessary, and that after being once renovated, digging over should be sufficient, as this would prune the roots and loosen the soil without rooting out the rich soil accumulated in the pits. Renovating may be carried on in coffee of any age, the earlier the better, as by its means a large amount of surface soil is saved from being washed away in the young days of an estate, when the soil is kept quite clean. The conclusion to be drawn from the above remarks would seem to be that to reap the full advantage from renovating pits they should be cut midway between four trees, that in a second renovating they should be at right angles to the first pits, that they should not be less than 18 inches deep, and that the sooner they are made after the trees are once established the better. Although we have heard this excellent work often decried, it is probably one of the best works that could be done on any estate, and with shade renovation pits form perfect patent manufactories of leaf mould.—*Planting Opinion.*

KAMERUNGA (CAIRNS) STATE NURSERY AT THE TOWNSVILLE SHOW.

Amongst the non-competitive exhibits at the late show of the Townsville Pastoral, Agricultural, and Industrial Association none attracted more attention than the exhibit of tropical products, prepared by Mr. H. Newport, coffee expert, who also manages the State Nursery at Kamerunga. From the *Northern Miner*, to which journal we are also indebted for the accompanying illustration of the exhibit, we take the following description of Mr. Newport's valuable and instructive collection of tropical products:—

The stall of exhibits from the Kamerunga State Nursery took pride of place in the non-competitive class, and considerable interest was evinced by visitors in the nicely arranged samples. Mr. Newport, the coffee expert, who is also manager of the Nursery, was present, and was most obliging in

Plate XXXVI.

Kamerunga Experiment Nursery at the Townsville Show.

explaining the nature of the various plants and their products to all who sought information. He was ably seconded by his lieutenant, Mr. G. B. Brooks, overseer at the Nursery, under whose superintendence the various exhibits had been both grown and prepared for the Show. The Nursery, as Mr. Newport explained, is intended primarily for prosecuting experiments in the cultivation of economic products, with a view to ascertaining which species are most suitable for the colony's soil and climate, and, judging by the contents of the nicely arranged stall referred to, the Cairns Nursery is likely to prove of decided benefit to North Queensland. Portions of the plants are shown in their natural state (an idea of the trees being given by photographs), and side by side are several of the articles of commerce prepared from the plants. The fibrous plants Mr. Newport holds to be specially suited for cultivation in the North, and on these he has expended considerable time and trouble, the result being most satisfactory. The samples of prepared fibre, from the strong Sisal to the beautiful soft pine-apple, appeared of excellent quality, and a splendid sample of Fourcroya, fully 10 feet long. There certainly seems a big future for the rope trade in Queensland, especially as it seems that fibres grow luxuriantly on almost any soil, and are wonderfully little affected by drought. Samples of tea were also shown, and for the growth of this useful commodity Mr. Newport considers our country specially adapted. There were numerous other interesting exhibits which space prevents our enumerating, the beans being especially noticeable. Another exhibit which attracted a good deal of notice was a shrub named Algaroba, which bears a copious crop of beans that make excellent cattle feed. The shrub thrives on poor and dry country, and should prove a valuable aid to pastoralists in seasons like the present. Altogether, the Kamerunga exhibit goes to show that most useful work is being done there.

It will be remembered that some months ago the committee made overtures to the Government for an exhibit from Kamerunga State Nursery, and their request was granted. They have been well compensated for their trouble. Mr. Howard Newport, the Government coffee expert, and Mr. G. S. Brookes, the curator of the nursery, arrived here on Sunday, bringing with them specimens of the more important products of Kamerunga. These have been arranged in splendid style, and will prove one of the features of the show. Here can botanists and others see to perfection what North Queensland soil of varied qualities is capable of producing. In the background are shown some forty-three varieties of New Guinea sugar cane, while on the table in front are to be seen fruits and coffee beans, the latter of different growths and showing in grades the advantages derived in their development through well-directed pruning. Then there are a number of young rubber-trees, embracing five different variets. Sorghums, tapioca, arrowroot, West African oil palms and nuts, also a sample of crude oil from the latter, spices of different kinds (including cinnamon), pepper, cocoa, and tea in its green and dried state. An interesting exhibit for stockowners will also be found in the Algaroba-tree, which is recognised as a valuable food for stock, and thrives wonderfully in the most impoverished and dry soil. Mr. Newport informs us that there has been a good demand for this tree. Beans and peas are also in evidence, while the value of some northern fibrous growths is demonstrated by ten different varieties, embracing Manila hemp, arnatto, Chinese burr, pineapple, Fourcroya, sida retusa, pink burr, wild banana, and Sisal hemp. These are all shown in their green and prepared states side by side. There are also specimens of Ramie, the fibre of which, however, is difficult to treat here. The fragrance of the Citronella grass can also be felt by rubbing it, the essence of which is valuable for scent preparations. Breadfruits of various kinds are shown, and there are also fine specimens of curry beans and powders.

SUGAR EXPERIMENT STATION, MACKAY.

REPORT ON CROPS FOR MONTH ENDING 31ST JULY, 1900.

Name of Crop—Block.		Planted.	Area.	Drilled or Broadcast.	Manure Applied. Name.	Manure Applied. Per Acre.	Rainfall during Month.	Treatment during Month.	Growth during Month.	Remarks.
			Acr's			cwt.				
Sorghum	A2	28-4-00	·20	Drilled...	None ...	...	2·717	Cultivated & scarified	Fair ...	Now 20 inches high.
Cow Pea	A3	28-9-99	·60	,,	,, ...	...	...	...	Nil ...	Being used as horse feed mixed with green feeds.
Small Mauritius Bean ...	A3	1-11-99	·05	,,	,, ...	...	...	...	Nil ...	Miserable crop.
Velvet Bean	A4	1-11-99	1·89	,,	,, ...	...	...	..	Nil ...	Very few seed pods on this.
Small Mauritius Bean ...	B1	21-11-99	·59	,,	...	...	...	...	...	Ploughed under after having collected all seed.
Small Mauritius Bean ...	B2^1	16-9-99	·08	...	...	...	...	...	...	Ploughed under.
Black Mauritius Bean ...	B2^1	16-9-99	·01	...	...	...	...	...	...	Ploughed under.
Small Mauritius Bean ...	B2^2	18-9-99	·31	...	...	...	...	...	Very little	Very good thick crop, but little seed.
Cow Pea	B4	23-2-00	·40	...	...	...	...	...	Nil ...	Miserable. Few seeds pods, but not worth collecting; ploughed under.
Velvet Bean	B5	4-11-99	2·24	...	...	...	...	...	Very little	All available seed been collected.
Small Mauritius Bean ...	C2 3 4	...	...	Drilled...	...	...	...	...	...	Lot of seed been collected, though crop not as heavy as B2^2.
Cow Pea	Outside	25-4-00	1·36	,,	...	...	...	...	...	Healthy and is now forming vine.
Grape Vines	...	...	...	...	...	...	...	...	...	Pruned and painted with calcium sulphide.
Thirteen Orange Trees ...	...	...	...	...	...	...	...	...	...	Pruned.
*Cane	B0	May	1·10	...	...	...	...	...	...	Growth most irregular. Some few slightly touched by frost.
*Cane	Laboratory B	May	...	...	...	...	...	...	...	Fair, though a few have made very little cane yet.
Pineapples	...	..	·20	...	...	...	...	...	...	Fair, though checked by cold and leaves slightly touched by frost.

* Analysis of these on separate sheet.

REPORT ON EXPERIMENTS FOR MONTH OF JULY, 1900.

Purpose of Experiment.	Name of Crop Operated upon.	Area.	Planted.	Drilled or Broadcast.	Manure Applied.	Method of Application.	Treatment during Month.	Rainfall during Month.	Growth during Month; with Details of Results of Experiments and Remarks.
As detailed previously	Sport Blk. Maur. B.	sq. yds. 2	8-3-00	...	...	...	...	2·717	Cut 20th July; 15·56 tons vine and ·27 tons roots per acre.
	Poor Man's Bean...	2	,,						Cut 20th July; 14·38 tons vine and ·44 tons roots per acre.
	Narico Bean ...	2	,,						Cut 20th July; 9·59 tons vine and ·37 tons roots per acre.
	Small Maurit. B. ...	2	,,						Cut 20th July; 25·59 tons vine and ·57 tons roots per acre.
	Madagascar B. ...	2	,,						Only two plants grew; but making most excellent growth now.
	White's Perennial Cow Pea	2	,,						Very good growth.
	Velvet Bean ...	2	,,						Growth slow, but healthy.
...	Cane	...	In boxes of sand.	...	As detailed previously	...	...	...	There were on 20th July:— 15 canes; total length, 352½ in.; average length, 23½ in. 2 new shoots; total length, 8½ in.; average length, 4·1 in. Four canes died this month.
	,, ...	...							8 canes; total length, 358½ in.; average length, 44·8 in. 2 new canes; total length, 57½ in.; average length, 14·3 in. One cane died this month.
	,, ...	...							7 canes; total length, 242 in.; average length, 34·6 in. 1 new cane; total length, 6 in.; average length, 6 in.
	,, ...	...							4 canes; total length, 86½ in.; average length, 21·3 in. 2 new canes; total length, 16 in.; average length, 8 in. Two canes died this month.
Second Series	In boxes of sand ...	1·46 sq.ft.	25-4-00	...	As detailed in May...	..	Weighed, &c.	...	Best growth.
	,,	3							Fourth best growth.
	Single eyes								Fifth best growth.
	"Stupid Singapore"								Third best growth (very close to second in growth).
	Cane being planted in each box								Second best growth.
									Sixth best growth.

PRELIMINARY ANALYSIS OF SUGAR-CANES (PRINCIPALLY NEW GUINEA VARIETIES) AT SUGAR EXPERIMENT STATION, MACKAY.

"Appendix to Report on Experiments for Month of July, 1900."

Date.	Farm or Block	Variety.	Age in Months.	Plant or Ratoon.	Analysis.					One Average Cane.		Remarks, &c.
					Cane S.	F.S.	Brix.	Quot.	P.O.C.S.	Weight in lb.	Length in feet.	
1900. July 4...	Lab. field ...	N.G. No. 66 ...	14	Plant	11·62	·88	15·51	75·	9·66	2·1	4½	This Cane Arrowing.
,, 5...	,, ...	,, ,, 65 ...	14	,,	11·59	1·00	15·83	73·	9·47	3·38	3	
,, 5...	,, ...	,, ,, 60 ...	14	,,	12·40	·81	15·83	78·	10·68	3·44	3	
,, 5...	,, ...	,, ,, 57 ...	14	,,	12·04	·45	15·51	78·	10·30	2·50	4½	
,, 5...	,, ...	,, ,, 55 ...	14	,,	12·68	·64	15·75	80·	11·14	2·75	4	
,, 9...	,, ...	,, ,, 56 ...	14	,,	8·76	1·69	12·83	68·	6·72	2·06	3½	
,, 9...	,, ...	,, ,, 53 ...	14	,,	11·40	·90	15·03	76·	9·58	5·4	6¼	
,, 9...	,, ...	,, ,, 49 ...	14	,,	13·23	·70	15·63	85·	12·03	5·	6	
,, 9...	,, ...	,, ,, 48 ...	14	,,	10·60	1·11	13·75	77·	9·02	3·5	6	
,, 9...	,, ...	,, ,, 46 ...	14	,	11·38	1·16	14·55	78·	9·79	2·5	3½	
,, 9...	,, ...	,, ,, 44 ...	14	,,	11·58	·59	14·55	80·	10·09	1·8	5¾	
,, 9...	,, ...	,, ,, 42 ..	14	,,	7·52	1·84	12·23	61·	5·16	3·1	4	
,, 9...	,, ...	,, ,, 40 ...	14	,,	9·72	·67	13·07	74·	8·04	3·6	4¼	
,, 9...	,, ...	,, ,, 39 ...	14	,,	13·88	·84	17·91	78·	11·86	2·2	4	
,, 9...	,, ...	,, ,, 37 ...	14	,,	10·60	1·16	14·19	75·	8·81	2·0	3·7	
,, 9...	,, ...	,, ,, 35 ...	14	,,	14·38	·95	16·35	88·	13·39	2·6	3½	
,, 9...	,, ...	,, ,, 34 ...	14	,,	11·08	·95	14·39	77·	9·42	3·0	5	
,, 10...	,, ...	,, ,, 31 ...	14	,,	9·86	1·81	14·23	69·	7·67	4·25	4¼	
,, 10...	,, ...	,, ,, 28 ...	14	,,	11·77	1·16	15·23	77·	10·04	2·31	3	
,, 10...	,, ...	,, ,, 26 ...	14	,,	8·99	1·37	13·23	68·	6·87	1·56	3	
,, 10...	,, ...	,, ,, 24A ...	14	,,	13·31	·46	16·39	81·	11·77	4·0	5	
,, 10...	,, ...	,, ,, 24 ...	14	,,	15·75	·35	17·83	88·	14·71	3·31	4¾	
,, 10...	,, ...	,, ,, 22 ...	14	,,	14·60	·50	15·83	92·	13·98	3·8	4·8	
,, 10...	,, ...	,, ,, 21 ...	14	,,	8·68	1·36	12·39	70·	6·82	2·25	4	
,, 10 ..	,, ...	,, ,, 19 ...	14	,,	9·72	1·42	13·83	70·	7·66	2·06	4¼	
,, 10...	,, ...	,, ,, 18 ...	14	,,	11·32	1·42	14·71	78·	9·63	2·88	5	
,, 10...	,, ..	,, ,, 17 ...	14	,,	13·82	·76	15·55	89·	12·95	3·13	5½	
,, 10...	,, ...	,, ,, 14A ...	14	,,	12·67	·76	15·71	81·	11·15	3·75	5	
,, 10...	,, ...	,, ,, 11 ...	14	,,	11·90	·90	15·35	78·	10·17	1·63	5½	
,, 10...	,, ...	,, ,, 6A ...	14	,,	12·28	·28	14·55	84·	11·14	2·50	4	
,, 10...	,, ...	,, ,, 4 ...	14	,,	11·96	·79	14·43	83·	10·72	1·63	3·1	
,, 10...	,, ...	,, ,, 1 ...	14	,,	12·99	·32	15·35	85·	11·82	2·0	4	

Preliminary Analysis of Sugar-canes (Principally New Guinea Varieties), &c.—*continued.*

Date.	Farm or Block.	Variety.	Age in Months.	Plant or Ratoon.	Analysis: Cane S.	Analysis: F. S.	Analysis: Brix.	Analysis: Quot.	Analysis: P.O.C.S.	One Average Cane: Weight in lb.	One Average Cane: Length in feet.	Remarks, &c.
1900.												
July 10...	Lab. field ...	Oraya	14	Plant	10·15	·98	13·31	76·	8·57	1·69	$3\frac{3}{4}$	
,, 10...	,, ...	Moo Moo Buku Du	14	,,	10·92	·41	14·43	76·	9·16	1·88	$2\frac{1}{4}$	
,, 10...	,, ...	Batoe	14	,,	16·20	·28	17·35	93·	15·62	3·25	$4\frac{3}{4}$	
,, 10...	,, ...	Arabora	14	,,	12·35	·62	15·07	82·	10·99	2·50	3·9	
,, 10...	,, ...	Chinome	14	,,	13·62	·44	17·35	79·	11·75	2·88	$5\frac{1}{2}$	
,, 10...	,, ...	Mavoe	14	,,	10·42	1·37	13·71	76·	8·77	4·04	$5\frac{1}{2}$	
,, 12...	,, ...	Moore's Purple ...	11	,,	15·52	·50	17·63	88·	14·46	3·06	4	
,, 12...	,, ...	Lahina. Hon. ...	11	,,	15·62	·51	17·03	92·	14·91	3·69	$4\frac{3}{4}$	From canes imported from Honolulu recently.
,, 12..	,, ...	Rose Bamboo Hon.	11	,,	14·23	·37	16·63	86·	13·03	4·19	$4\frac{3}{4}$	Ditto.
,, 12...	,, ...	Striped Meera ...	11	,,	13·29	·37	15·11	87·	12·38	2·63	4	
, 16...	Bo	Mavoe	14	,,	12·50	1·05	14·59	86·	11·45	5	$5\frac{3}{4}$	Bo is a sandy flat on bank of lagoon.
,, 16...	,, ...	Oiva	14	,,	12·85	1·08	15·26	84·	11·64	3·13	$4\frac{1}{2}$	
,, 16...	,, ...	Batoe	14	,,	11·81	·66	14·61	81·	10·41	2·63	4·1	
,, 16...	,, ...	Tikarea	14	,,	12·62	·94	14·81	85·	11·53	2·38	$3\frac{1}{2}$	
,, 18...	,, ...	N.G. No. 10 ...	14	,,	12·51	·95	14·55	86·	11·49	3·63	$5\frac{3}{4}$	
,, 18...	,, ...	,, ,, 11 ...	14	,,	13·31	·94	10·58	85·	12·17	1·5	6	
,, 18...	,, ...	,, ,, 14A ...	14	,,	14·00	·75	16·03	87·	12·98	3·75	4	
,, 18...	,, ...	,, ,, 14 ...	14	,,	12·99	1·06	15·33	85·	11·82	5·25	6	
,, 19...	,, ...	,, ,, 15 ...	14	,,	15·30	·46	16·88	91·	14·51	3·75	3·9	
,, 19...	,, ...	,, ,, 16 ...	14	,,	14·40	·39	15·98	90·	13·61	3·5	4·8	
,, 19...	,, ...	,, ,, 18 ...	14	,,	13·62	·72	15·83	86·	12·51	1·5	3·2	
,, 19...	,, ...	,, ,, 24 ...	14	,,	14·00	·41	16·13	87·	12·93	1·5	3·7	
,, 21...	,, ...	,, ,, 24A ...	14	,,	12·64	·47	14·81	85·	11·55	1·94	3	
,, 21...	,, ...	,, ,, 34 ...	14	,,	11·50	·94	13·93	83·	10·28	2·13	3	
,, 21...	,, ...	,, ,, 41 ...	14	,,	10·92	·52	13·77	79·	9·49	2·38	3·1	
,, 21...	,, ...	,, ,, 42 ...	14	,,	13·04	·96	15·93	82·	11·59	2·25	$4\frac{1}{4}$	
,, 21...	,, ...	,, ,, 57 ...	14	,,	14·47	·45	16·51	88·	13·45	1·44	3·2	
,, 21...	,, ...	,, ,, 59 ...	14	,,	11·90	·92	14·55	82·	10·57	2·31	$2\frac{3}{4}$	
,, 21...	,, ...	,, ,, 65 ...	14	,,	13·28	·58	16·07	81·	11·88	1·75	3	
,, 21...	,, ...	,, ,, 66 ...	14	,,	13·20	·91	16·43	80·	11·58	1·25	3·2	

Note.—The average weight and length of cane is recorded for the purpose of helping comparison, instead of making the remark that the cane is "thick" or "thin, 'long" or "short," &c,

A NEW CANE PLANTER.

There was exhibited at Bowen Park last month a novel machine for cane-planting, the invention of Mr. Pryce Trevor, of Bundaberg, the general idea of which is given in the accompanying illustration. The machine is very light, and consists practically of a pair of light wheels with a pole, carrying a ploughshare with a sort of double perpendicular mould-board underneath the bed of the machine. These boxes contain the sets, which pass up a small carrier set in motion by the acti n of the wheels as the machine is drawn along. From the carrier in which the plants lie horizontally they pass down a delivery tube which they enter perpendicularly, and fall into the furrow made by the plough. The arrangement of the so-called mould boards allow a sufficient quantity of soil to fall back into the furrow after the plants are in position to properly cover them. We understand that the draught of the implement is very light, two men and two horses being able to plant as much ground as the latter can walk over in a day—about 5 acres. The plants are all laid evenly and regularly in the furrow, and the automatic covering does away with all the trampling of the soft soil which accompanies the old method of covering with the hoe.

Planters who have used the machine speak very highly of it, and state that it can do the work of thirty men. There are three plant boxes with it, which can carry sufficient plants to obviate the necessity of a dray or a number of men to replenish them. The machine can be regulated to plant cane at any required depth or distance apart. It is stated that by the use of these machines, a saving of 10s per acre may be effected—a very important saving when large areas have to be planted.

RAT AND WALLABY PESTS.

"Experientia" writes to the *Mackay Sugar Journal*:—

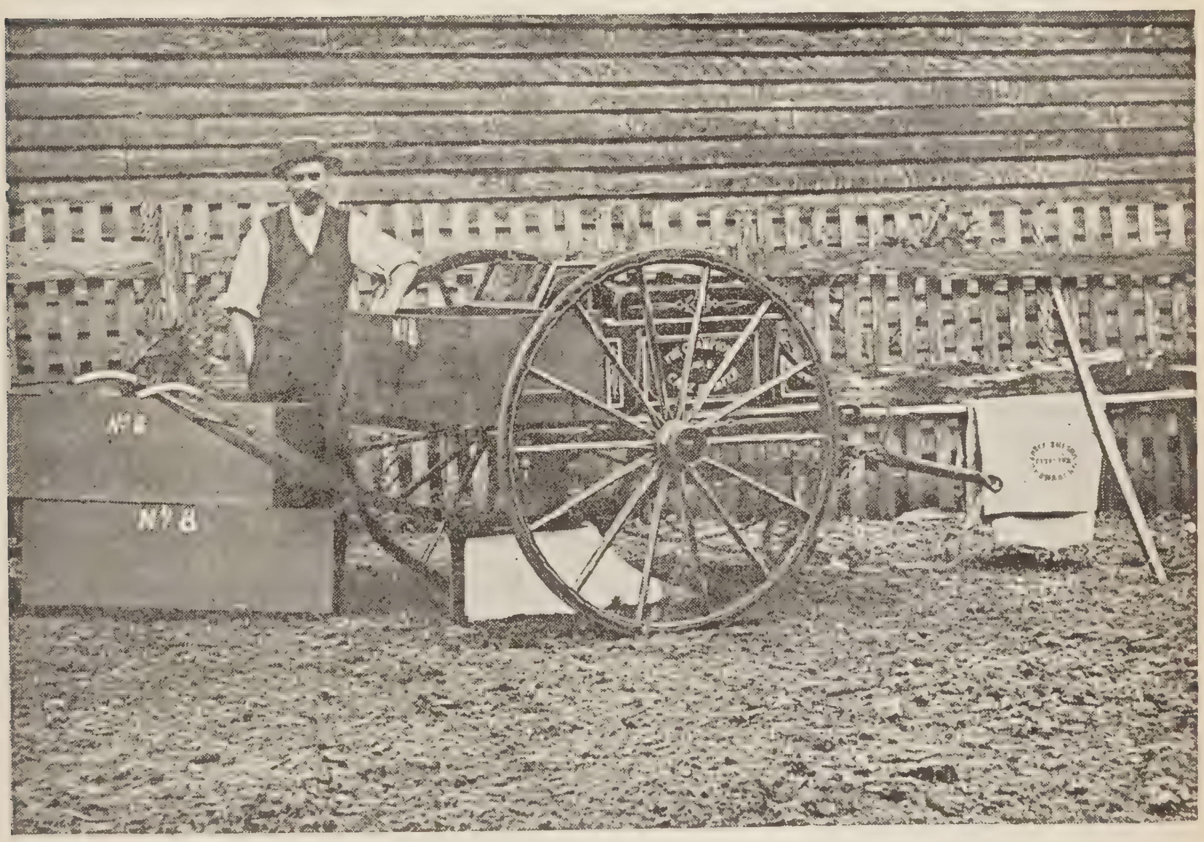
RAT-POISONING IN THE CANEFIELD.

In 1899 the rat plague was bad in many canefields, and some success has been attained at Habana in destroying the pest. A few particulars of how it was done may be of interest to your readers. At first while there was any cane crop on the ground it was found difficult to get the rats to take poison, but, as soon as the crop was off, great slaughter was done by laying baits of cane, the cane being split into two or more pieces, according to size, about 6 inches long and saturated by dipping in a 2 per cent. solution of strychnine; as long as there was very little new cane to be got, this remained an apparently irresistible attraction to the rats; after the cane was up, the rats were not so keen, and a new medium of bait had to be tried. After trying several, the following has turned out the most successful:—Green sweet potatoes sliced up into small pieces; the small potatoes were mostly used, allowed to dry for twenty-four hours, and then as above dipped in a 2 per cent. solution of strychnine. These are taken freely, and numerous dead rats found.

WALLABY DESTRUCTION.

Much cane is yearly lost by the depredations of the wallaby, but much could be saved by the use of a simple trap. The trap consists of a pliable 1 to 1½ inch diameter sapling, and a piece of string. The sapling is used as the spring of the trap, one end being put in the ground, while from the other the string with a noose is suspended. The sapling being put in the ground, the string with a small catch of wood is used to bring the spring into bow-shape, a wallaby run is chosen and the loop spread out, the spring being retained in place by twisting the catch once around a side trestle and placing a stick from the catch on to a trestle opposite. The two trestles and retaining bar of spring catch are in centre of string loop, and if a wallaby strikes the bar the catch is released, and the loop catches the wallaby. In one case where thirty of these traps were set in scrub along 25 chains, as many as 120 wallabies were caught; the biggest day's catch was 11 head, but now only one or two a day. The trestles are merely two scrub forks with a stick across them about 4 to 6 inches high and 12 to 15 inches apart.

Plate XXXVII.



The Pryce-Trevor Cane Planter.

Forestry.

BRIEF NOTES ON SOME TIMBER TREES OF THE BURNETT DISTRICT OF QUEENSLAND.

No. 5.

By J. W. FAWCETT,
Member of the English Arboricultural Society.

123. *Phyllanthus Ferdinandi*, Muell. Arg.—

A moderate-sized scrub tree, with bright green foliage, oval oblong leaves, small flowers (September to January), and orbicular fruit capsules; yields a closely-gained, easily-worked grey timber, which warps in drying.

124. *Phyllanthus lobocarpus*, Benth.—

A small scrub tree, with dark rugged bark, oblong lanceolate leaves, green on the upper and pale on the under side, and lobed fruit capsules; yields a tough, elastic, close-grained, pinkish timber, useful for axe, pick, and other tool handles.

125. *Petalostigma quadriloculare*, F. v. M.—Crab Tree; Bitter Bark; Emu Apple; Native Quince.

A small forest tree, with oblong, almost round, leaves, more or less silky on the under side, monœcious flowers and orange-coloured fruit capsules; yields a hard, close-grained, dark-brown timber, which shrinks much in drying. The bark possesses a powerful bitter and qualities like the Peruvian bark, and is often used as a tonic.

126 *Croton insularis*, Baill.—Queensland Cascarilla Bark.

A small, compact scrub tree, with rough, fragrant bark, ovate lanceolate leaves, monœcious flowers (November to January), and small three-lobed capsules; yields a hard, tough, close-grained yellow timber.

127. *Baloghia lucida*, Endl.—Scrub Bloodwood.

A medium-sized scrub tree, with rough bark, glossy, deep-green oblong leaves, large white fragrant flowers (August to October), and globular, hard prickly capsules (ripe November to January); yields a tough, close-grained, prettily-marked, light-yellow timber, useful for cabinet-work. The sap, without any admixture, forms a beautiful red indelible pigment. The timber, which burns freely when green, seems to contain an oily secretion.

128. *Alchornea ilicifolia*, Muell. Arg—Queensland Holly; Spruce Holly.

A small straggling scrub tree, with dull green holly-like leaves, diœcious (December and January) flowers; and small depressed globular capsules; yields a tough, hard, close-grained yellow timber.

129. *Mallotus philippinensis*, Muell. Arg.—Kamaa Tree.

A small scrub tree, with rusty foliage, oval leaves, diœcious flowers, and reddish mealy capsules (ripe in November); yields a hard, very tough, close-grained, straw-coloured timber. The bark is useful for tanning, and the red mealy powder surrounding the capsules affords a good dye.

130. *Excaecaria agallocha*, Linn.—Milky Mangrove; River Poison-bark.

A moderate sized tree found on the estuaries of saltwater creeks and rivers, with smooth bark, yellowish foliage, fleshy oblong leaves, orange-coloured (male) flowers (October to December), and small capsules; yields a soft, light, close-grained, whitish timber, useful for turnery. The bark of this tree contains an acrid milky juice or sap, which is poisonous, and was formerly used by the aborigines for poisoning their spears.

131. *Excaecaria dallachyana*, Baill.—Scrub Milkwood; Scrub Poison-bark.

A small slender spreading scrub tree, with dark green foliage, ovate lanceolate leaves, diœcious flowers (November to January), and three-lobed capsules; yields a soft, tough, elastic, yellowish timber, with black heartwood, suitable for axe and pick handles. The bark yields a pure white, milky sap, having an acrid nauseous taste, and poisonous.

URTICACEÆ.

132. *Trema aspera*, Blume.—Peach-leaved Poison-bush; Rough Fig.

A small scrub tree, with smooth bark, rough, narrow, ovate leaves, small cymose flowers (August and September), and black ovoid drupes; yields a tough, firm, close-grained, whitish timber.

133. *Aphananthe philippinensis*, Planch.—Colonial Elm; Tulipwood.

A small scrub tree, with dense foliage, rough-toothed ovate leaves, cymose flowers and ovoid drupes; yields a tough, elastic, close-grained, light-coloured timber.

134. *Ficus Cunninghamii*, Miq.—

A large, but not regular deciduous tree, with spreading head, glossy light-green oval oblong leaves, and globular smooth fruit receptacles, at first white, but turning to a pretty purple when ripe (November and December); yields a soft, porous, light-coloured timber.

135. *Ficus macrophylla*, Desf.—Giant Fig Tree, Large-leaved Fig Tree; Moreton Bay Fig Tree.

A large and magnificent wide-spreading tree, with often very large buttresses to the trunk, large leathery oval-elliptical dark glossy leaves, and globular or pear-shaped fruit receptacles of a purplish colour spotted with white (November to January); yields a brittle, soft, spongy, coarse-grained, light-coloured timber, which is difficult to season, sometimes used for packing cases. The bark yields a milky sap, which, when thickened, may be converted into a kind of indiarubber.

136. *Ficus aspera*, Forst.—Rough-leaved or Purple Fig; Black Fig; "Boorkol."

A moderate-sized tree, with dark-coloured bark, rough foliage, oblong-elliptical leaves, and dark purple or blackish fruit receptacles (October to December); yields a brittle, spongy, close-grained, yellow timber.

137. *Ficus glomerata*, Willd.—Clustered Fig Tree.

A large tree with spreading head, light-coloured hairy foliage, narrow oval leaves, and edible reddish fruit receptacles (November and December); yields a soft, light, porous, coarse-grained straw-coloured timber. The figs are sometimes used by settlers for making jelly.

138. *Cudrania Javanensis*, Trec.—Cockspur Thorn; Dyewood.

A dwarf, coarse, straggling scrub tree or large shrub, with thick stem, yellow, corky bark, the trunk and branches armed with spines, oblong leaves, diœcious flowers, and roundish yellow mulberry-like fruits; yields a close-grained timber, the heartwood being very hard and of a dark-yellow colour, used for dying yellow and brown.

139. *Laportea gigas*, Wedd.—Giant Nettle Tree; Large Stinging Tree; Stinging Nettle Tree.

A large scrub tree with thick trunk, smooth ash-coloured or grey bark, large heart-shaped leaves, smooth above and sprinkled with a few stinging hairs, but more or less covered with short soft hairs underneath, diœcious flower (September and October), and the fruit an oblique flattened nut with fleshy pedicels; yields a soft, juicy, fibrous, spongy, brownish timber of no value. A strong fibre is obtained from its bark.

140. *Laportea photiniphylla*, Wedd.—Shining-leaved Stinging Tree; Small-leaved Nettle Tree.

A fine scrub tree, with straight stem, soft grey bark, green shining ovate leaves, nearly smooth and sprinkled with a few stinging hairs, diœcious flowers (September and October), and the fruit a large nut with white fleshy pedicels (December); yields a soft, spongy, brownish timber. From the bark a good fibre is obtained, used by the aborigines for making fishing nets.

141. *Laportea moroides*, Wedd.—Smooth-leaved Nettle Tree.

A tall shrub or small scrub tree, with broad ovate leaves covered with short, soft, but most virulent stinging hairs, diœcious flowers (June to August), and the fruit a nut, much like a raspberry in appearance, with succulent purplish pedicels (ripe in August and September), yields soft, spongy timber. The bark yields a good fibre.

142. *Pipturus argenteus*, Wedd.

A small scrub tree, with ovate, slightly-toothed leaves, with the under sides hoary white, on long pink stalks, diœcious flowers (September to January), and small white sweet edible fruits; yields a soft, close-grained, brown timber. The bark yields a good fibre.

CASUARINEÆ.

143. *Casuarina glauca*, Sieb.—River She-oak; Swamp Oak; Bull Oak; Beefwood.

A moderate-sized, robust, forest tree, generally growing on the margins of rivers and creeks, with rough greyish bark, pendulous branchlets, diœcious flowers, and subglobose fruit cones; yields a handsome, elastic, hard, strong, tough, durable, reddish timber, useful for shingles and staves, wheel spokes, tool handles, and cabinet work.

144. *Casuarina equisetifolia*, Forst.—Coast Oak; Horsetail Oak.

A moderate-sized forest tree, found growing near saltwater marshes and swamps, and inlets, with rough bark, greyish drooping branches, diœcious flowers, and globular fruit cones; yields a durable, hard, light, tough, coarse-grained, beautifully marked, dark-coloured timber, useful for purposes where lightness and toughness are required.

145. *Casuarina suberosa*, Ott. et Dietr.—Erect She-oak; Black Oak.

A moderate-sized, often tall, erect forest tree, generally found in local patches, with rough bark, pendulous branchlets, diœcious flowers (September), and oblong fruit cones; yields a durable, hard, strong, tough, coarse-grained, prettily marked, dark-brown timber, useful for shingles, staves, bullock yokes, and for cabinet work.

146. *Casuarina torulosa*, Ait.—Corky-barked Oak, Forest Oak, Beefwood.

A moderate-sized forest tree, with corky bark, slender drooping branches, diœcious flower, and globular fruit cones; yields a hard, tough, close-grained, nicely-marked, reddish timber, useful for veneers and cabinet-work, furniture, bullock yokes, staves, and shingles.

CONIFERÆ.

147. *Callitris robusta*, R. Br., var. *microcarpa*.—Pine-tree; "Koolooli."

A tall tree of the coastal districts, with dense dark-geeen head, greyish bark, monœcious flowers, and globose cones. Yields a very useful, durable, close-grained, fragrant, dark-coloured timber, excellent for cabinet-work, the rootstock furnishing excellent veneers; also valuable for wharf-piles and sheathing of boats, as it resists attacks of the toredo.

148. *Callitris Endlecheri*, Parlat.—Cypress Pine; Black Pine; Red Pine.

A moderate-sized scrub tree, with slender drooping or erect dense branches, whorled leaves, monœcious flowers, and oblong fruit cones. Yields a valuable, strong, durable, easily-wrought, close-grained, fragrant, dark-coloured timber,

capable of a high polish; useful for cabinet-work and ornamental fitting, telegraph poles and wharf piles, and sheathing of boats and punts. It possesses a pungent property that enables it to resist the attacks of the toredo and white ant. A gum or resin exudes from this tree which resembles Sandarac. Very rare in the Burnett district; in the scrubs on the higher lands in the West.

149. *Araucaria Cunninghamii*, Ait.—Moreton Bay or Hoop or White Pine; "Koonam."

A tall noble-looking tree, with a regular pyramidal form, thick brownish bark; whorled spreading branches; sombre green awl-shaped foliage; diœcious flowers (November and December), and ovoid fruit cones; yields a valuable strong, durable, light, easily wrought, straw-coloured timber, useful for cabinet-work, house-building, and interior fittings. The timber from trees growing on the ranges is stronger and finer-grained than that grown in alluvial scrubs.

150. *Araucaria Bidwilli*, Hook.—Bunya Pine.

A large and noble tree, with straight trunk, smooth thick bark, whorled branches, glossy green foliage; diœcious flowers, and large cones; yields a strong durable light-coloured timber, full of beautiful veins, and capable of being polished and worked with the greatest facility.

WOOD PULP AND FORESTRY.

The serious attention of the lumber trade is being directed to the rapid depletion of the American forests, and the application of scientific forestry in place of the present wasteful and destructive methods is being inculcated by the forestry section of the Department of Agriculture. Some indication of the immense consumption of timber in the manufacture of news paper in this country is given in an excerpt from an exchange which claims that while it is a well-known fact that the newspapers of the world are using up the forests for their supply of paper, there are probably few people who will not be startled at the announcement made by one of the chief New York papers that its Sunday Easter number would take all the wood of 40 acres of virgin forest. This journal claims to use in its morning and evening editions some 11 acres of woodland, producing about 7,000 feet to the acre. Something like 280,000 feet of timber was used for the supply of reading matter to New York by this one paper alone.

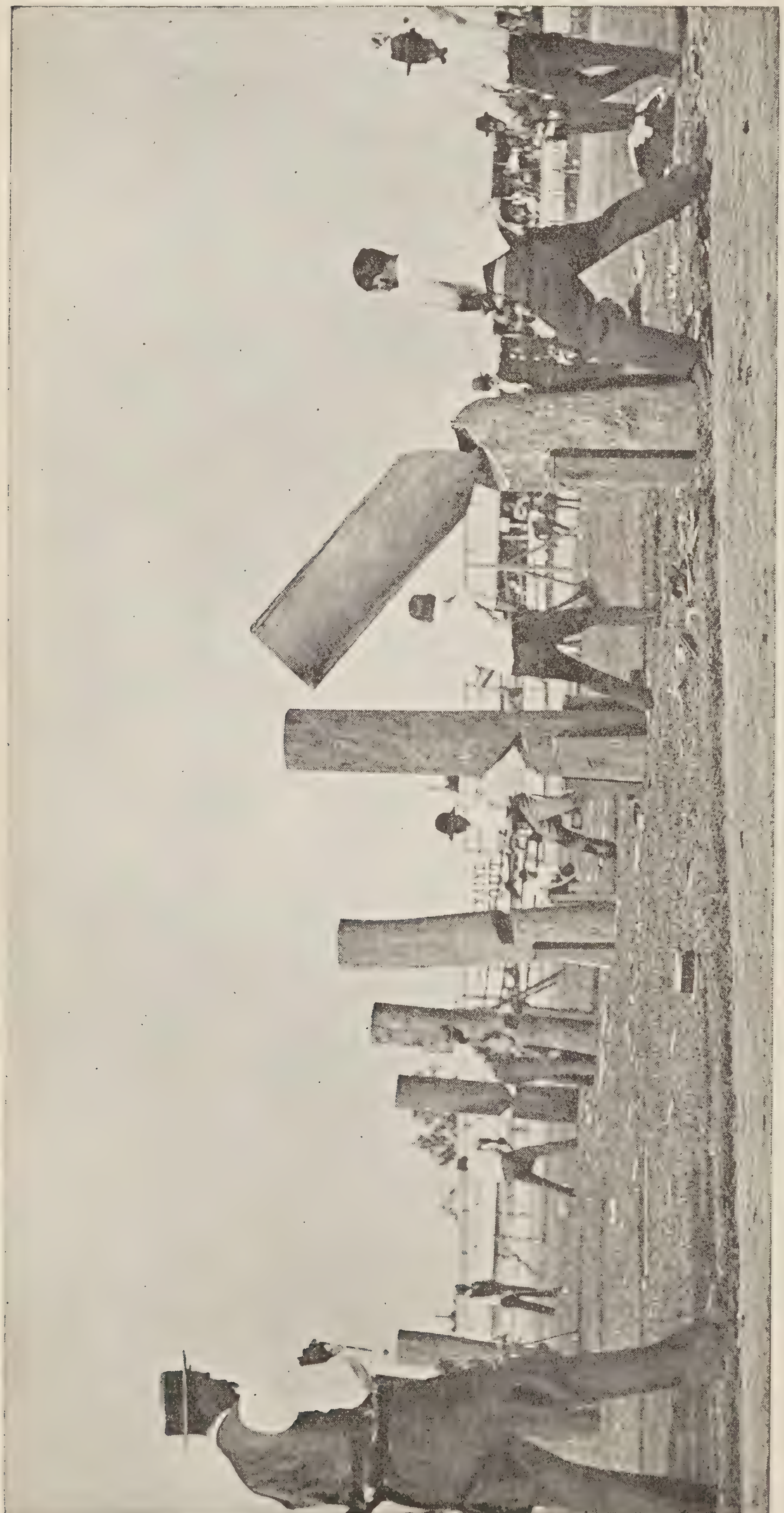
Forestry, as has been pointed out by an authority on the subject, has been too generally regarded as an æsthetic fad, and its scientific application merely an agreeable avocation of the very wealthy. It is, however, an importance to our natural well-being far beyond mere æsthetic considerations—powerful though these may be. It means the utility of vast areas of non-agricultural lands in every part of this country By its application we are assured of the permanency of our lumber supply and the stability of the lumber trade.

The regulation and conservation of the water supply of our principal rivers is largely dependent on the timbered lands, and the favourable influence of tree culture upon climate has been well set forth by our forestry experts.

The application of scientific forestry, however, owing to the slowness of the growth of the trees, is not within the means of any single person or organisation without the control of great wealth. The work is for State or federal Governments, unless the taxation upon forest lands shall be abolished or reduced to a minimum.

The establishing of national parks is one of the methods advocated for the introduction of scientific forestry where the destruction of the timbered and non-agricultural lands has been most marked. An association has been formed in Chicago to urge the parking of a large area in Minnesota; and in Asheville, North Carolina, the Appalachian National Park Association has been

Plate XXXVIII.



Wood-chopping Contest at Bowen Park. Frnest Terry, N. S. W., Winning the First Heat.

organised for the protection of the magnificent forests of the Southern Appalachian mountains by placing them under the regulation of the Government as a national park.

These efforts are strictly in accord with the teachings of the forestry section of the Department of Agriculture, for the support of which the nation makes a liberal appropriation. That the Congress will take suitable measures to give to the country the parks petitioned for, with the vast economic reforms which they represent, may reasonably be expected.—The *Inland Printer*, Chicago and New York.

WOOD-CHOPPING AT BOWEN PARK.

Our artist, Mr. F. C. Wills, chose a singularly happy moment for obtaining our illustration of the winning first heat in the wood-chopping contest at the Exhibition by Mr. Ernest Terry. The contest was considered of very great interest, giving as it did an opportunity to city dwellers to learn how our stalwart timber-getters deal with the forest from which they obtain their living. Amongst the onlookers were several who had earned a livelihood with the axe years before the nineteen-year-old champion was born. These criticised the work of the various competitors keenly, and it was the general opinion that the style of cutting adopted by the winner—which is generally practised in New South Wales and Tasmania—ensures quicker work than the straight lower cut adopted by the Queensland men. There is no doubt that the first style of work is far more fatiguing than the latter ; but once a man is an adept at it, and has the necessary strength, wind, and activity, he is almost sure to get through a tree quicker than the other man, particularly if the tree be at all free.

The reason is clear. Although, at first sight, it would appear that the axeman who chops up and down takes out more wood than the man who chops down and then straight, yet it must be remembered that a slanting cut will

always penetrate deeper than a straight cut. Therefore if two slanting cuts are given, one below and the other above the scarf, those two blows have got further into the tree than when the lower cut is straight, as sh wn in the diagrams. And the farther the work proceeds, the more rapidly will the first man's chips fly, and he has the further advantage of not being compelled, by finding that his cuts have met too soon, to take a fresh cut to make the scarf large enough to enable him to reach the centre of the tree. We hope to see more of this healthy bushwork at a future exhibition, when shingle-splitting and post-morticing might be added to the programme.

The time taken by Terry in the first heat was 3 minutes 18 seconds, and in the final 4 minutes 33 seconds, the logs being bloodwood, 18 inches in diameter; the other competitors taking, respectively, 5 minutes 40 seconds and 6 minutes 10 seconds. His Excellency the Governor and Lady Lamington evinced much interest in the contest, and at its conclusion the young New South Welshman was introduced to Lord and Lady Lamington, who shook hands with him and congratulated him on his skill.

Science.

THE GRAZING AND AGRICULTURAL LANDS OF QUEENSLAND.

NOTES ON THE GAYNDAH DISTRICT, WITH A PRACTICAL BEARING ON THE QUESTION OF WATER SUPPLY.

By W. GIBBONS COX, C.E.

The following notes, taken during a recent residence in the country of which they treat, will be found to specially bear upon an increased water supply, with a view to neutralising the ruinous effects of the periodical droughts to which this fine district is subject.

That portion of the district under consideration is comprised in the country about Mingo Station, a portion of which has been recently resumed by the Government and laid out in grazing farms. The distance in a direct line from the coast is about 100 miles, and it is about 50 miles west of the first or coastal range. The general surface features are characterised by low ranges and spurs with extensive intermediate valleys, in the lower parts of which are the Burnett River and numerous creeks.

The meteorology of the district shows that the climate is salubrious. There is very little frost during the winters, and the summer heat does not exceed 95 degrees Fah in the shade. The nights are invariably cool and pleasant. The rainfall averages 31 inches per annum, which may be taken as a fairly good fall.

The district is thickly timbered with valuable ironbark, gum, bloodwood, Moreton Bay ash, and other less important arboreal growth. It is well grassed, both in the valleys and on the sides of the ranges. There is also the prickly pear; but it is a remarkable fact that although this vegetable scourge is found here in small, isolated patches, it does not appear to flourish or spread to any great extent. The conditions of soil or climate, or both, must differ so far as this vegetable growth is concerned from those of the Darling Downs, for instance, where it has been found very difficult to prevent it spreading over large areas, or to eradicate it. Such efforts have never, apparently, been required in the Gayndah district.

The district is particularly well adapted for grazing purposes and for agriculture; the rich, decomposed matter of which the soil is composed will ensure this, and there is ample evidence of its adaptability to vegetable and fruit growing. Sweet potatoes and oranges do exceedingly well, as is evidenced by the fine specimens raised at the old station buildings.

The geological formation consists of metamorphic schists and granite. The low ranges and hills, which were formerly high mountains, have been subjected during ages of time to decomposition and its attendant disintegration. The action of rainfall during the wet seasons has washed the decomposed materials into valleys which were formerly of much greater depth. Numerous creeks were formed by the passage of the rain water falling on the higher ranges. The courses of the creeks have been altered from time to time, and have left extensive areas of alluvial deposit. The soil of these deposits, in combination with the decomposed matter of the ranges, consists of black-coloured loam of the richest description.

A remarkable feature of this district is that the sides of the ranges afford good pasturage for cattle. This is doubtlessly due to the decomposed rock being of so tenacious a nature that it clings to the rock surface and is only washed partially away during heavy rainfall. In the far away by-gone times, ages upon ages ago—when the tops of the ranges reached an altitude of which the present height is comparatively an insignificant quantity, when decomposition of the rock surface went on over a much larger area, and when the catchment area of the rainfall was greater accordingly and at a vastly greater elevation—the accumulation of water upon the higher reaches of the ranges produced, by

gravitation, a scouring action of a force scarcely calculable excepting in the form of the results we now see. The mountains have been levelled and the valleys have risen through the combined agency and operation of the sun's heat and the rain from above. The effect has been both a chemical and a mechanical one. Every drop of rain that has fallen there, absorbing, as it has done, carbonic acid from the atmosphere, has, in combination with the solar heat, produced decomposition of the rocky surface, and the gravitating flood water has done the rest. The great compensating principle which rules Nature's laws has here an exemplification: subsidence and upheaval—disintegration and deposit.

Although in the particular district under review a great deal of this rich, decomposed material of the ranges has been washed away down the creeks to lower levels and the Burnett River, there still remain vast accumulations of the material both in the beds of the present creeks and in the extensive areas before mentioned which lie around the present courses of the creeks. and *it is within these deposits that there exists large natural conservations of water* which, after the creeks have ceased to run, and drought hovers over the land, lie unseen, unrecognised, unused, and unrecorded.

In regard to its subterranean water-bearing capabilities, although this district, from its geological formation—*i.e.*, the prevalence of igneous and metamorphic rocks, and the absence of the cretaceous artesian formation—will not give artesian supplies, there is without doubt a vast amount of water lying in the deposited materials from the ranges. The form assumed by the surface of the rock below the subsoil deposits is of an undulating character, with outcrops laid bare in the line of the creeks. Between these outcrops are long stretches of deep deposit forming natural tanks. The water lying in these receptacles is drawn upon by and is sustaining the growth of a great number of large, vigorous she-oaks; the beds and sides of the creeks are, in fact, full of them. These, with the usual large water-absorbing gums along the sides and in the vicinity of the creeks, draw off the valuable accumulation of water to an extent which cannot be well calculated, but must amount to a very large percentage of the natural flood deposit. The remedy for this waste is, of course, in ringbarking. During a moderate drought, cattle and horses travel for miles over this line of water supply, starving for want of a drink. Without burdening this paper with a technical engineering description of a remedy for this state of things, it may be remarked that assumedly if doctors could have their own way there would be little sickness. Likewise, if engineers could exercise their knowledge and skill to a greater extent, droughts in this country would be of a far less formidable nature than they are at the present time.

It will be seen from the character of this district that it is admirably adapted for irrigation. The large periodical accumulation of rain water on the ranges permits of it being conserved at any level along the line of creeks by means of dams thrown across them. This could be done effectually and economically, the water being held as it is in the natural conservations in the beds of the creeks, instead of being permitted to pass to lower levels and into the Burnett River. The time will assuredly come when Australia will necessarily show a perfect system of water utilisation, both of the subterranean and direct rainfall supplies, and the sooner this is approached, if only on a small scale to commence with, the better it will be for the economical development of the country. As I stated in a course of lectures I gave recently at the Queensland Agricultural College at Gatton on boring, subterranean supplies, and irrigation, "although Australia suffers normally from a scarcity of surface river supplies and periodical droughts, the rainfall is as great as in most other countries, but the bulk of that rainfall sinks into the porous water-bearing strata—be it shallow sub-artesian or the deeper artesian formations—and is held there at our disposal. This country is not, as it was formerly believed to be, a drought-stricken land. It cannot be that so long as the rain falls and we are careful to utilise that rain in the best possible manner. We complain of droughts at the same time that incalculable quantities of valuable water are permitted to remain penned up in the ground or to run to waste down our creeks and rivers to its final inaccessible outlet, the ocean.

SUGAR EXPERIMENT STATION, JAVA.

The following is a short review of a pamphlet we have received from Mr. Pruisen Gurlig's Station, in Java. The pamphlet, translated by Mr. A. A. Ramsay, manager of the Mackay Sugar Experiment Station, contains accurate descriptions of the various cane diseases, remedies, &c., which are very long, and might not be of sufficient interest to general readers of your *Journal*, and for which reason I have omitted them. This also applies to the third and fourth parts.

COLLECTION BY THE SUGAR EXPERIMENT STATION AT KAGOK-TEGAE, WEST JAVA, EXHIBITED AT THE EXPOSITION UNIVERSELLE, PARIS, 1900.

This station, under the direction of H. C. Pruisen Gurlig, was established in 1886 by the manufacturers of West Java.

The original aim of the station was to study the cultivation of cane and cane diseases, especially "sereh," though the work now undertaken has a much wider scope.

The cost of this work—70,000 to 75,000 francs per annum—is met without any Government assistance.

EXHIBITS.

First.—A collection of sugar-canes, accompanied by a short description as to their history, introduction, &c. Included in this is a cane having multiple eyes at the nodes.

Second.—Examples of diseases in sugar-cane in Java caused by vegetable parasites

This is subdivided into diseases affecting the stem, sheath, leaves, and roots, and is accompanied by a short description of the disease, the extent of damage caused by it, the cause (if known), and suggested remedies.

Third.—A collection of animals, &c., prejudicial to the sugar-cane in Java. The collection is subdivided into—(1) Mammalia, (2) birds, (3) insects, (4) arachnida*, (5) crustaceans, (6) worms.

This is accompanied by a concise statement of the nature of damage caused, and remedies against the damage are suggested.

Fourth.—Various mixtures of sugar, glucose, water, and an organic salt (acetate of potash), to prove Pruisen Gurlig's theory of the formation of molasses. Gurlig's theory is the following :—

Organic salt, of which acetate of potash is the type, combines readily with sugar and glucose, but for preference with glucose, forming soluble compounds of a very hydrated nature

If the solution only contains cane sugar and an organic salt it only forms the combination sugar—organic salt and water.

Let us consider the case : When the quantity of organic salt is very little, the amount of the compound will be very little, and will therefore contain little sugar. So soon as it becomes very hydrated it attracts much water from the solution, so that the water still free cannot retain in solution all the sugar non-combined. This explains why minimum quantities of salts favour crystallisation.

If the quantity of organic salt be increased the quantity of sugar entering into combination becomes so great that enough does not remain to saturate the quantity of free water, consequently, in presence of much organic salts, a greater quantity of sugar can dissolve than in the same quantity of water. This takes place in the absence of glucose ; but if glucose be added, the organic salts takes possession for preference of this to form hydrated soluble compounds. They form, then, in the first place, glucosates, hydrates which abstract so much water from the solution that the sugar is precipitated in large quantity.

In the case where the quantity of organic salts increases the proportion in which the sugar enters into combination becomes greater, so that the solubility of the sugar increases as soon as the proportion of organic salts has passed a certain limit, which varies with the nature of the salts employed, with the concentration of the solution, and other circumstances unnecessary to mention.

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* Spiders, mites, scorpions, &c.

Animal Pathology.

SWINE FEVER.

By A. H. CORY, M.R.C.V.S.

This disease was first detected in England in 1862, and in America under the name of "hog cholera" in 1833 (Ohio).

During the summer of 1895 I had to visit a great number of swine-fever cases and suspected cases in various districts of the West of England

The disease presents a variety of symptoms during life—none of which are really diagnostic. Perhaps the most common are: The animal appears dull, head often drooping, refusal of ordinary food—but great thirst. Temperature raised 2 degrees or 3 degrees. Diarrhœa often, but sometimes the discharges are clay-coloured—with a quantity of mucous and blood—resembling dysentery. The urine is scanty and highly coloured, but in mild cases where the animal is going to recover this soon returns to its normal condition. The skin occasionally shows red patches of inflammation—some say these patches are slightly swollen—chiefly seen on the abdomen, inside the thighs, and on the face and ears. A somewhat similar condition of the skin is seen when pigs have had salt or brine accidentally mixed with their food; one case I particularly remember where the owner had been mixing a large quantity of sea-weed and stinging nettles with the pigs' food—this caused red patches on the skin

The most typical lesions found on *post-mortem* examination of pigs dead from the disease are as follow:—The bowels are chiefly affected—more particularly the large bowels: these show peculiar necrotic (dead) patches of the mucous membrane, leading to the well-known swine-fever ulcers, which are characteristic of the disease. These vary in size, from a two-shilling piece downwards, and generally extend through the whole thickness of the mucous membrane, and may even penetrate the muscular coat of the bowel. In recent cases, the surface of the ulcers is dry and firm, and the mucous membrane may appear more or less ringed round these necrotic patches. The colour of the ulcers is usually a dark-grey—but may be yellowish, due to bile-staining. The small glands in the mucous coat are sometimes enlarged, and may contain some fragments of food. This gives them, at first sight, an appearance very similar to small ulcers, but it is proved by gently scraping the surface and removing the particles of food. The ulcers sometimes project above the ordinary level of the mucous membrane. The coecum is the most common seat of ulcers, and the projection of the small bowel into the coecum—known as the ileo-coecal valve, but in chronic cases the whole of the large intestines have more or less numerous ulcers. In cases where the animal survives, the ulcer is thrown off as a sluff, due to the activity of leucocytes round the base of ulcer. These leucocytes have migrated from the bloodvessels round the lesion, and have, so to speak, been at war with the dead or necrotic cells—finally leaving only a scar to mark the original seat of the ulcer. But occasionally in chronic cases a tumour-like structure is found due to thickening of the mucous membrane round the ulcer, and in rare instances the necrosis has extended through the whole thickness of the intestine, so causing perforation.

Another common swine-fever lesion is termed a "diphtheritic lesion." This consists of a superficial necrosis of the mucous membrane, with a fibrinous coagulate in its substance and on its free surface. Recovery is thought to take place even if this diphtheritic lesion extends over a large surface of the mucous

membrane of the bowels, provided it is not too deep; then only a thin layer of the mucous membrane would be thrown off, and the remaining cells of the membrane would make up the loss. In a chronic case of this variety, the mucous membrane and general wall may become so thickened that one can cut a so-called window out of the bowel without its collapsing.

Next to the large intestines the small ones are the most common seat of lesions, here generally taking the diphtheritic form, which, when the necrosed epithelium is thrown off, remains as small ulcers. The ilium is frequently affected for a foot or two, with only a few patches of normal, or apparently normal, mucous membrane. The first part of the small bowel is not nearly so commonly affected. One other common swine-fever lesion found is very acute gastritis (inflammation of stomach), the fundus portion being chiefly affected. This is usually of a bright scarlet colour, and may be accompanied with small hæmorrhages. Ulcers have been found in the stomach and mouth, but these were absent in all the *post-mortems* which I made.

The liver is generally apparently healthy, but may be congested. Small necrotic spots, about the size of mustard seeds, have been found, which are very like in appearance to a miliary tuberculosis of the liver. It is not uncommon to find any of the organs in a state of congestion, or they may even show small hæmorrhages, as in the kidneys and abdominal lymphatic glands.

At one time the lungs were said to be affected in nearly all cases of swine fever—pneumonia, with probably pleurisy following. But it has now been proved by bacteriologists, both in England and America, that it is very exceptional for the swine-fever bacillus to cause pneumonia; this is generally caused by some accidental complication. Where the swine-fever bacillus causes pneumonia it takes the form of a circumscribed pneumonia, followed by necrosis of lung tissue, but it is very doubtful if the swine-fever bacillus ever causes necrosis of any part. The swine-fever bacillus probably only acts as an irritant to the part, and so prepares the ground for the necrosis bacillus which is always present in the pig's intestine.

Swine fever is now known to be caused by no other organism than the swine-fever bacillus—a small rod-shaped organism which is an obligatory parasite (never propagates outside the living animal body); therefore fresh outbreaks are due to contagion. The bacillus is always found in the tissues of the body and the various lesions, seldom if ever in the blood—unless in acute septicæmic cases —when it can be shown by cultivation, at the body temperature, in gelatin-agar, but microscopical examination of blood is said by experts to be useless for detecting the organism. The swine-fever bacillus has a characteristic growth in gelatin-agar, either in stab cultures or plate cultures. In stab cultures a thick haze is seen to extend from the needle track, and in plate cultures there is also a hazy appearance on the cultivated spots—at the outer edges rather indistinct. It grows rapidly in bouillon, but renders it turbid throughout, without any scum or surface growth. This swine-fever organism has very little power of resistance; a few minutes' exposure at a temperature of 58 degrees C. will sterilise a culture.

The method to exterminate this disease in England was to kill all infected animals, and a very strict isolation of all pigs which had been in contact with infected animals, with thorough cleansing and disinfection of all houses, yards, &c. So we had infected farms quite isolated from all other farms and markets for at least six weeks or two months.

SWINE ERYSIPELAS.

This disease is far from being common in England. Until recent years it was not distinguished from swine fever. On the Continent very serious outbreaks occur, causing a much higher fatality than swine fever, death frequently taking place in two or three days. In England it is seldom there is an acute outbreak, but, as a rule, a few so-called chronic cases occur which appear to break out sporadically.

When pigs are affected with this disease, a red discolouration of the skin is usually noticed, which, in many cases, is swollen. On *post-mortem* examination, the stomach and intestines (large and small) are commonly found very much inflamed, but no ulceration or necrosis, or any diphtheritic lesion, which distinguishes it from swine fever. The other organs are frequently in a state of congestion—spleen enlarged and kidneys inflamed (hæmorrhagic nephritis)—and the muscles of the heart and the liver are said to undergo degeneration.

Some pigs survive after an acute attack, but they do not thrive as before; and it is common after a time (a month or two) to find these pigs dead. *Post-mortem* examination of these cases shows that the disease had affected the internal membrane of the heart (endocardium) and the valves of the heart.

Swine erysipelas is caused by the swine-erysipelas bacillus, another small, rod-shaped organism. It is chiefly a blood parasite, but can be found after death in any of the lesions, as in the heart lesions mentioned above. In the blood the bacillus is usually found singly, but in the lesions and tissues in the form of chains or threads.

This bacillus of swine erysipelas can be grown best in gelatin in stab cultures, at body temperature. Small slender processes are then seen to radiate from the needle track, forming what is commonly likened to a tube brush. One notices that the growth does not extend quite up to the top of the gelatin, thus showing that this bacillus has a tendency to be anaerobic (grows better in the absence of oxygen than in the presence of it). One other organism has a very great resemblance to this one when grown in gelatin—viz., the bacillus of mouse septicæmia, but this is not a natural disease of the mouse, but produced experimentally.

The swine-erysipelas bacillus is a facultative parasite (can live and propagate in the living body or on dead organic matter). It is commonly thought to exist in soil or dirt, and so gain entrance to the pig's body.

Vaccination was tried on the Continent by Pasteur to prevent this disease. The vaccine consisted of an attenuated culture obtained by cultivating in rabbits for a series of generations, but the result was not very satisfactory, as the vaccination caused death in a great number of cases. Blood serum has since been tried for inoculation, but with what result I am at present unable to state.

SWINE PLAGUE; or, INFECTIOUS PNEUMONIA OF THE PIG.

As the name indicates, this is a lung disease. The animal may be noticed to be dull and quiet, with the respirations increased, and an occasional cough, together with the usual symptoms of fever.

This is a rapidly fatal disease, death often taking place in twenty-four to forty-eight hours. It appears as a very contagious disease on the Continent, but generally assumes a much milder form in England, as in the case of swine erysipelas. Pigs are thought to be in a weak state before they are affected with this disease; for example, it is sometimes found as a complication of swine fever, which has so enfeebled the animal's body that it is a suitable host for the swine-plague bacterium.

On *post-mortem* examination the constant lesion found is pneumonia, frequently accompanied by necrosis and degeneration of the lung tissue. This bacterium is almost entirely confined to the lung lesions, seldom found in any other parts.

There is some doubt whether the swine-plague bacterium is a facultative or an obligatory organism, but it is thought to be the former.

It is short and rod-shape in form, with rounded ends, thus having an ovoid appearance. When stained with ordinary analine dyes, the ends are much darker than the centre. Unlike the swine-fever bacillus, this bacterium is non-motile, and much smaller. It is easily cultivated in gelatin or gelatin-agar, at summer temperature. It has no special characteristic growth, but simply forms small, white spherical colonies. This organism resembles very closely that of fowl cholera and some putrefactive organisms, and can only be differentiated by noticing the various effects produced by the different organisms.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1899.							1900.					
	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.
North.													
Bowen	Nil.	0·63	0·21	0·06	0·56	Nil	2·92	7·61	0·40	0·88	0·59	0·89	1·14
Cairns	0·63	2·01	1·31	3·23	0·74	0·33	4·57	43·06	1·98	8·90	3·77	3·56	1·66
Geraldton	1·64	8·93	2·85	9·03	1·03	Nil	4·89	62·26	2·36	8·86	8·86	8·33	2·34
Herberton	0·66	0·23	0·36	1·62	0·18	2·75	0·73	11·90	0·23	1·97	2·19	0·[illegible]7	0·12
Hughenden	0·20	0·46	2·05	Nil	0·45	1·05	0·33	6·43	1·04	0·01	Nil.	0·11	0·02
Kamerunga	...	...	...	...	...	...	...	..	1·01	8·60	3·25	3·65	Nil.
Longreach	0·60	1·08	0·28	0·06	0·27	0·67	Nil.	1·68	0·48	Nil.	Nil.	0·14	Nil.
Lucinda	0·40	2·78	0·80	0·97	0·02	1·26	1·02	37·35	1·71	4·90	4·44	9·08	1·10
Mackay	Nil	2·29	2·37	1·33	0·19	0·49	7·65	20·86	0·65	4·12	2·40	2·89	2·00
Rockhampton	0·40	2·23	1·71	1·96	2·35	1·22	11·02	4·53	0·25	1·64	0·93	1·38	0·71
Townsville	Nil.	0·78	0·89	0·01	0·35	0·16	0·53	21·09	0·07	1·68	0·87	2·31	0·41
South.													
Barcaldine	0·05	1·03	0·53	0·27	0·94	0·52	0·04	3·08	0·65	0·09	2·03	1·38	0·29
Beenleigh	5·70	6·98	2·02	3·11	2·53	1·80	7·40	5·42	3·19	3·16	1·25	7·55	2·18
Biggenden	...	...	...	...	...	...	...	...	0·40	2·81	0·28	3·06	1·43
Blackall	0·20	1·11	0·57	0·16	1·20	0·04	0·85	1·73	1·31	0·63	0·63	2·19	0·33
Brisbane	2·75	3·50	1·43	2·48	2·26	2·33	7·61	6·51	5·18	3·37	1·38	5·45	2 68
Bundaberg	1·42	2·33	2·62	1·67	1·60	0·06	7·62	4·63	0·86	1·86	1·15	3·97	1·46
Caboolture	2·67	4·61	1·90	2·40	2·30	2·23	7·44	3·04	4·18	5·66	1·42	7·04	2·14
Charleville	0·25	0·33	1·26	0·55	0·36	0·43	0·16	1·01	0·08	0·79	Nil.	1·15	1·31
Dalby	1·33	1·67	1·09	1·20	1·44	1·84	2·89	0·41	6·31	2·80	2·46	2·54	1·29
Emerald	0·03	1·31	2·08	1·96	1·93	1·32	0·40	3·08	1·22	3·97	0·42	2·72	...
Esk	2·40	2·59	1·69	2·79	2·67	2·25	5·34	1·42	2·34	4·73	1·50	4·78	1·89
Gatton College ...	1·18	2·01	1·55	2·19	2·13	3·50	5·87	2·40	4·07	3·13	2·24	4·24	1·15
Gayndah	1·30	0·86	3·34	1·24	2·73	4·59	7·37	2·52	2·07	1·11	1·22	2·57	0·88
Gindie	...	...	...	...	...	..	...	...	0·57	1·04	0·96	3·01	0·92
Gympie	3·57	2·26	1·23	2·11	2·41	0·39	6·44	5·59	1·84	2·76	1·05	3·63	0·82
Ipswich	1·82	2·42	1·29	2·77	2·04	3·46	4·66	2·79	1·66	1·85	1·47	4·73	1·45
Laidley	1·32	2·00	1·82	5·04	3·17	2·40	6·50	0·64	3·15	2·87	1·94	4·36	1·41
Maryborough	4·20	1·71	1·49	2·29	1·20	0·51	4·13	4·88	1·78	3·26	1·17	4·33	1·21
Nambour	6·17	4·18	1·81	3·13	2·87	3·03	11·11	4·07	5·64	4·67	2·78	7·77	1·35
Nerang	3·34	9·80	2·52	4·74	1 99	1·42	6·31	4·60	3·37	3·06	0·47	18·28	2·84
Roma	0·53	1·05	1·00	0·55	0·35	1·27	0·99	0·43	1·52	4·40	0·23	2·07	2·14
Stanthorpe	1·36	3·11	1·08	1·63	1·36	0·86	3·22	2·62	4·81	1·87	1·70	3·17	1·22
Taroom	0·61	1·27	1·60	1·55	0·83	3·32	0·65	1·78	3·65	2·92	2·11	2·55	1·40
Tambo	0·60	1·16	0·74	0·27	0·79	0·08	0·66	2·28	1·55	0·30	0·02	2·94	1·49
Tewantin	9·28	5·00	3·67	2·80	3·36	0·46	8·22	1·69	4·87	5·36	1·02	5·90	3·03
Texas	3·26	2·95	1·38	1·72	0·97	0·74	2·67	1·56	3·39	1·63	1·48	3·35	1·86
Toowoomba	2·11	1·75	1·63	3·15	1·43	2·36	4·75	1·01	2·90	2·87	2·00	4·67	1·69
Warwick	1·53	2·44	1·00	1·99	2·48	1·67	3·83	1·84	4·19	1·93	1·01	3·31	1·23
Westbrook	...	...	...	...	...	...	....	...	3·71	1·78	1·81	3·04	1·16

NOTE.—The figures for Nerang during the month of May (1·28 inches) were erroneously given by us in the August number of the *Journal*. They should have read 18·28.—Ed *Q.A.J.*

A. W. ANDERSON,
Acting Government Meteorologist.

QUEENSLAND PRODUCTS IN BRITISH MARKETS.

BUTTER.—Danish, 106s. to 112s. to 116s. per cwt.; American, 86s. to 90s.; Canadian creameries, 90s. to 94s.; Australian and New Zealand quotations are now nominal, at prices ranging from 96s. to 98s. per cwt.

CHEESE.—New Zealand, 56s. to 60s.; Canadian, 52s. to 53s.; American, 49s. per cwt.

SUGAR.—Refined, £14 15s. to £15 per ton; syrups, £10 10s. to £12 10s. German beet, 88 per cent., 9s. 6½d. to 9s. 8d. per cwt.

SYRUPS.—10s. 6d. to 12s. 6d. per cwt.

MOLASSES.—Common dark, 6s. to 7s. 6d. per cwt.

RICE.—Patna, fine, £19 to £23 per ton; Java, fine to finest, £20 to £24 per ton; Straits, 8s. 3¾d. per cwt.

COFFEE.—Finest Nicaragua peaberry, 60s. to 125s. per cwt.; Ceylon plantation, good to middling, 44s. to 85s.; bold blue, 60s. 6d. to 84s.; Santos, 38s. to 41s. 3d.; long berry Mocha, 88s. to 112s.

ARROWROOT.—Large supplies, small demand. St. Vincent quoted at 2¼d. to 3½d. per lb., with no sales recorded; Bermuda, 1s. 8d. to 1s. 10d.; Natal, 5½d. to 8d.

WHEAT.—Australian, 29s. 3d. per 480 lb., about 3s. 8d. per bushel; American, 31s. per quarter; German, 30s. per sack.

NEW ZEALAND OATS.—22s. 6d. to 24s. 6d. per 384 lb.

GINGER.—Small and medium, washed rough, 29s. to 31s. per cwt., Jamaica, 2s. to 3s., decline on last quotations; ratoon, 37s. to 43s.; common, 45s. to 47s. 6d.; low middling to good middling, 53s. to 61s.; good, 66s. to 71s.; fine bold, 81s. to 86s. per cwt.

PEPPER.—Bombay capsicums, 31s. 6d. to 90s. per cwt.; Natal long red chillies, 92s. to 95s. per cwt.

TOBACCO.—Prices for pipe tobacco on 1st August, 1900—Pipe tobacco:—Kentucky leaf: Common to fair, 3d. to 5½d.; coloury, good to fine, 7½d. to 9½d.; Kentucky strips: Common to good, 3½d. to 7½d.; fine, 8d. to 11d. Virginia leaf: Common to fair, 3d to 6d.; coloury, good to fine, 8d. to 13½d. Virginia strips: Common to good, 4d. to 8d; fine, 8d. to 12½d. Cigars: Sumatra, 7d. to 5s.; Manila, 3d. to 4s.; Havana, 8d. to 5s.

WINE.—Fair red wine (Australian claret type), in bond, 2s. to 2s. 6d. per gallon; fine old quality, 4s. 6d. per gallon; Australian Muscat, 4s. 6d. to 6s. per gallon.

GREEN FRUIT.—Apples: Tasmanian, the last important shipment of the season brought 12s. to 17s. per case. Oranges: Murcia, 18s. per box (200's); Valencias, 16s. to 30s. for 420's. The shipment of Australian oranges per "Ophir" turned out poorly, and sold at from 9s. to 14s. per case. Lemons: Extraordinary prices have been realised in London for lemons. Common, 420's, 21s. to 24s.; ordinary, 26s. to 28s.; best, 30s. to 35s. Bananas, 8s. 6d. to 14s. per bunch.

EGGS.—Australian, no quotation; best Danish, 6s. 3d. to 7s. per 120; Irish, 6s. 6d. to 7s.; ducks', 7s. 6d. to 8s.; Russian, 5s. 3d. to 5s. 6d.; French, 6s. 6d. to 9s.

HONEY.—Californian, 45s. per cwt.

OLIVE OIL.—£35 to £36 10s. per tun (252 gallons). Eating oil, £50 per tun.

LINSEED OIL.—£28 10s. to £29 10s. to £36 (with casks) per ton.

SISAL HEMP.—£18 to £30 per ton.

WOOL.—20th July. The fourth series of wool sales which opened on 3rd July has closed firmly without further change. Out of the net quantity available the sales have been: Home consumption, 73,000 bales; Continent, 50,000 bales; America, 2,000 bales; total 125,000 bales; leaving to be carried forward to the closing sales of the year, opening 9th October, 158,000 bales. Net available series just closed, 283,000 bales. As compared with the closing rates of the third series of last sales, the position of prices is as under: Good greasy merino wools, 8 per cent. lower; medium and inferior greasy merino wools, also scoured merino and fine crossbred wools 10 per cent. lower; medium and coarse crossbred wools, par.

At the May sales in London, Queensland wools sold as under:—Greasy: Burenda, 207 bales fleece at 11½d. Bowen Downs, 801 bales fleece at 9⅞d. Bulgaroo, 189 bales fleece at 8½d.; 10 bales pieces at 8½d. McW/Rodney Downs, 73

bales fleece at 10⅝d. N.Z. and A.L. Co./Wellshot, 362 bales fleece at 9d.; 270 bales pieces at 8½d. T.C. in block/Retro, 135 bales fleece at 11⅛d.; 17 bales pieces at 9½d. Ruthven, 39 bales fleece at 11d.; 18 bales pieces at 10d. A.P. Co./Cubbie, 14 bales fleece at 11½d. Bullamon, 284 bales fleece at 9½d.; 44 bales pieces at 9½d. Myalla, 47 bales fleece at 9⅝d.; 21 bales pieces at 7¾d. A.P. Co./Gnoolooma, 194 bales fleece at 10⅝d. D.S.W./Terrick, 246 bales fleece at 11d. B.B.R./Emmet Downs, 145 bales fleece at 11¼d.; 63 bales pieces at 10⅝d. C. & Co./Kensington Downs, 40 bales fleece at 8½d. The fifth series of sales will open on 9th October.

FROZEN MEAT.—The following are the latest quotations, August 11, for the various descriptions of frozen meat mentioned (last week's prices being also given for comparison):—

New Zealand Mutton.
(Crossbred Wethers and Maiden Ewes.)

	Aug. 4.	Aug. 11.
Canterbury	3⅝d.	3½d.
Dunedin and Southland	3⅜d.	3 5/16d.
North Island...	3 5/16d.	3¼d.

Australian Mutton.
(Crossbred and Merino Wethers.)

Heavy (over 50 lb.)...	3 1/16d.	2 15/16d.
Light (under 50 lb.)	3d.	2 15/16d.

River Plate Mutton.
(Crossbred and Merino Wethers.)

Heavy...	3⅜d.	3 1/16d.
Light	3⅜d.	3 1/16d.

New Zealand Lambs.

Prime Canterbury (32 lb. to 42 lb.)	4¼d.	4¼d.
Fair average	4d.	4d.

New Zealand Frozen Beef.
(Fair Average Quality.)

Ox, fores (100 lb. to 200 lb.) ...	3⅛d.	3¼d.
Ox, hinds (180 lb. to 200 lb.) ...	4⅜d.	4¾d.

Australian Frozen Beef.
(Fair Average Quality.)

Ox, fores (160 lb. to 200 lb.) ...	3d.	3⅛d.
Ox, hinds (160 lb. to 200 lb.) ...	4 1/16d	4⅛d.

The above prices are the official quotations furnished by the Frozen Meat Trade Association. The basis of quotations is sales of lines of not less than 100 carcasses of mutton or lamb, or 25 quarters of beef. All the quotations for mutton are for average quality. Quotations for New Zealand and Australian lambs do not include sales of small lambs or heavies or inferior quality.

BACON.—Irish, 64s. to 66s.; American, 37s. to 45s. 6d. per cwt.

HAMS.—49s. to 52s. per cwt. Special brands of Irish (smoked), 78s. to 96s. per cwt.

HIDES.—Ox hides, first, 4⅜d.; second, 3½d.; ox hides, 95 lb. and over, 4⅝d.; 55 lb. and under, 3¼d. Latest London quotations:—Heavy Australian ox hides, 4½d.; light, 4⅜d.; cow, 4⅛d. Horse hides, first, 17s. 9d.; second, 15s.; third, 13s. 6d.

SKINS.—Pelts, 1s. 6d., 2s., and 2s. 4d.; wools, 3s., 4s. 6d., 5s., 5s. 6d., 6s. 3d., and 7s.

TALLOW.—Colonial beef, £26; mutton, £27 10s. per ton.

Plate XXXIX.

Haystacks at the Westbrook State Farm.

General Notes.

ANOTHER WAY TO MEASURE STACKS.

Here are a few simple rules for determining the amount of hay in a stack or mow, when it is not convenient to weigh it (says the American *Cultivator*). Selling by measurement is not always the most satisfactory method, but it is sometimes the most convenient. Sellers are disposed to insist that a cube of 7 feet is a ton. This is entirely too small, and will not weigh out. How many cubic feet will make a ton depends on so many conditions that no certain rule can be given. It depends on the kind of hay, whether Timothy, lucerne, or prairie; on the character of the hay, whether fine or coarse; on the condition in which it was put in the stack, the length of time it has been there, and particularly on the size, especially the depth of the stock or mow. In a very large mow, well settled, 100 cubic feet of lucerne or Timothy may average a ton, but on top of the mow or in a small stack it requires 500 to 512 cubic feet, sometimes even more. It is not safe for the buyer to figure on less than 500 cubic feet, but in a well-filled stack, in selling, it would be safer to weigh than to sell at that measurement. To find the number of tons in a barn mow or hayshed, multiply the length, depth, and breadth together, and divide by the number of cubic feet, which, considering the quality of hay and the condition in which it was put up, will make a ton. For long stacks or ricks multiply the length in yards by the width in yards, and divide the product by fifteen, and this should give the tonnage. To measure a cone-shaped stack find the area of the base by multiplying the square of the circumference in feet by the decimal ·07958, and multiply the product thus obtained by one-third of the height in feet, and then divide as before, cutting off five right-hand figures. The correctness of this will depend somewhat on the approximation of the stack to a regular cone, and if the stack bulges out it makes the product too small. The better way is to estimate the area of the stack up to the point of tapering in, and apply the rule to the cone-shaped top. The best way is to weigh. The experience of weighing a few stacks will enable any one to judge quite correctly. Another approximate rule for measuring a round stack is this: Select a place which is as near as possible to what the average size would be if the stack were of uniform diameter from the ground to the top of the point. Measure round this to get to the circumference at the right, and divide the whole by 3·1559 to get the diameter. Now multiply half the diameter by half the circumference, and the feet of the circumference area is obtained. Multiply by the number of feet the stack is high, and the solid or cubic feet in the whole is ascertained. Then divide by the number of cubic feet in a ton, which ranges all the way from 370 to 512, according to the fineness and compactness of the hay. This will give the number of tons in the stack.

A RUBBER PLANT FOR TEMPERATE CLIMES.

In a recent lecture at the Paris Académie des Sciences (says *Das Handelsmuseum*), Messrs. I. Dybowski and G. Frou introduced a new rubber furnishing plant, a native of Northern China, which is at present cultivated with great success at the Jardin des Plantes, the Paris Horticultural Gardens. Up to the present time rubber has been extracted from trees only, and efforts have been made to acclimatise those from the Netherland East Indies in the French colonies, but, unfortunately, without any result whatever. This new plant, called *Encomia illinoides*, whose fruits contain over 27 per cent. of indiarubber, has great economical advantage. It can easily be acclimatised and cultivated in countries of even a moderate climate.

CO-OPERATIVE DAIRIES IN DENMARK.

According to a statement made by Professor Liljhagen at a meeting of the Swedish Agricultural Academy, there are now 1,550 dairies established by co-operative associations and joint stock companies in Sweden. The number of co-operative dairies is 450, of which 300 manufacture butter only, 100 manufacture cheese only, and the remaining 50 produce both butter and cheese. Of the 1,100 dairies run by joint stock companies 800 are engaged solely in the production of butter. In addition to the foregoing establishments there are about 200 estate dairies, and a large number of smaller private dairies.

FRUIT TREES IN SAXONY.

A German agricultural journal says that in the years 1897 to 1899 the fruit trees in the province of Saxony (Prussia) were carefully counted, and it was found that they numbered 12,793,461, in the following proportions:—Plum trees, 52·7 per cent.; apple trees, 19·6 per cent.; cherry trees, 16·8 per cent.; and pear trees 10·9 per cent. The average value of each tree being taken at 8 marks (8s.), these trees represent a capital of 100,000,000 marks, or £5,000,000.

FOOD VALUE OF THE BANANA.

The banana plant, says J. de Loverdo, in *El Progress de Mexico*, will feed 150 men from the product of 1 hectare of land so planted; while the same area in wheat would only supply food for six individuals. For the same space, and under similar conditions of cultivation, its production is forty times that of potatoes and 100 times that of wheat. The fruit of the banana contains 72 per cent. of water, 2·14 per cent. of nitrogenous matter, and 22 per cent. of saccharine substances, the latter giving it its great nutritive quality.

TO PREVENT RUST.

Very often, through carelessness in cleaning machinery, rust is allowed to gather on exposed parts. Prevention is better than any attempted cure, and this recipe of a practical machinist is said to be very effectual in preventing machinery from gathering rust: Melt together 1 lb. of lard and 1 oz. of camphor. Skim the mixture carefully, and stir in a sufficient quantity of black-lead to give it the colour of iron. After cleaning the machinery thoroughly, smear it with the mixture, and let it remain for twenty-four hours. Then go over it with a soft cloth, rubbing it clean.

LIFTING OUT FENCE POSTS.

A correspondent asks us to invent a new and expeditious way of lifting fence posts. Here it is (taken from the *Australian Pastoralists' Review*):—

Lifting out fence posts by means of a team of bullocks may not be new to some of your readers, but as the plan is so neat and expeditious I will endeavour to explain it. A team of, say, eight bullocks is ranged up alongside a fence that has already had the wires removed. Two chains (strong) are hooked on to the yoke of the last pair of bullocks. To the end of the chain that drags is attached a long sapling pole 15 feet or so, the chain being fastened 18 inches from the end. One man grasps the opposite and thinner end, and as the bullocks walk along the fence he guides the chained end so as to catch near the bottom of the post desired to be lifted. The strain of the bullocks pulling is easily held against by the long pole, and the pull brings out the post and lays it on the ground. There is no loss of time making the attachment, the bullocks walk on continuously, and the posts are laid down as easily and regularly as a reaper and binder lays down its sheaves. Two men can, by this means, when ground is soft, pull up in a day just the distance of fencing that a bullock team can walk along.

Plate XL.

The Donald Wool Press

VALUE OF FOWL MANURE.

Four hundred pounds weight of hen manure is equal in value to 2,400 lb. of farmyard manure. In a ton of fowl manure analysis showed 48·60 lb. phosphoric acid, 48 lb. potash, and 67 lb. nitrogen; whilst farmyard manure contained only 6 lb. phosphoric acid, 10 lb. potash, and 11 lb. nitrogen in 1 ton. Much of the value of any manure depends upon its freshness, and whether it has been kept under cover and dry.

REMOVING PARTICLES FROM THE EYE.

Small particles of cinder and metal are constantly getting into the eyes of engine-drivers and stokers. They have one invariable way of getting them out. No sooner has the driver of an engine got a nasty bit of grit in his eye than his companion, the stoker, opens the eyelids quite wide and licks out the unseen fragment which might produce tragic results sometimes with his tongue. The public knows little of this heroic remedy, but on every line in the world it is being applied every hour of the day. All surgeons recognise that this is often, with all their beautiful instruments, the only way. And amongst the thousands of women connected with the English fishing trade who have to clean herrings it is also practised as the only method of getting out of the human eye the very minute herring scales that lodge there and soon produce serious mischief if not removed.—*Sydney Mail.*

QUALITY *V.* QUANTITY.

A San Francisco tea-vendor issued a circular lately, so it is said, in which the following occurs:—

50 c. Tea—1 lb. makes 100 cups
1 teaspoonful for 1 cup

60 c. Tea—1 lb. makes 150 cups
1 teaspoonful for $1\frac{1}{2}$ cups
15 c. cheaper than 50 c.

75 c. Tea—1 lb. makes 175 cups
1 teaspoonful for $1\frac{3}{4}$ cups
25 c. cheaper than 50 c.

$1 Tea—1 lb. makes 200 cups
1 teaspoonful for 2 cups
Twice as good and just as cheap as 50 c.

Planting Opinion suggests that, although the line of argument is admirable, one calculation is not quite "according to Cocker."

DONALD'S PATENT WOOLPRESS.

This press, which we noticed in our issue of 1st August, was exhibited in operation at the late Exhibition, and elicited much favourable criticism. It did its work effectually, and only required the labour of two men. Our illustration should have appeared last month, but was omitted by an oversight.

AGRICULTURAL AND HORTICULTURAL SHOWS.

The Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may have been decided on.

The Markets.

AVERAGE TOP PRICES FOR JULY.

Article.		JULY. Top Prices. £ s. d.
Bacon	lb.	0 0 7
Bran	ton	6 2 6
Butter, First	lb.	0 1 $0\frac{3}{4}$
Butter, Second	"	0 0 $7\frac{5}{8}$
Chaff, Mixed	ton	3 18 9
Chaff, Oaten	"	4 15 0
Chaff, Lucerne	"	4 3 9
Chaff, Wheaten	"	2 17 6
Cheese	lb.	0 0 $7\frac{1}{4}$
Flour	ton	8 15 0
Hay, Oaten	"	4 17 6
Hay, Lucerne	"	3 6 3
Honey	lb.	0 0 $1\frac{9}{16}$
Rice, Japan (Bond)	ton	16 0 0
Maize	bush.	0 3 $3\frac{1}{8}$
Oats	"	0 4 $1\frac{3}{4}$
Pollard	ton	6 1 3
Potatoes	"	4 3 9
Potatoes, Sweet	"	1 13 $1\frac{1}{2}$
Pumpkins	"	1 17 6
Sugar, White	"	17 10 0
Sugar, Yellow	"	14 0 0
Sugar, Ration	"	11 0 0
Wheat	bush.	0 3 $4\frac{1}{2}$
Onions	cwt.	0 5 $10\frac{1}{2}$
Hams	lb.	0 0 $9\frac{3}{4}$
Eggs	doz.	0 1 $0\frac{3}{4}$
Fowls	pair	0 3 $6\frac{3}{4}$
Geese	"	0 5 $1\frac{1}{2}$
Ducks, English	"	0 3 $5\frac{1}{4}$
Ducks, Muscovy	"	0 4 6
Turkeys, Hens	"	0 7 0
Turkeys, Gobblers	"	0 14 3

ENOGGERA SALES.

Article.	JULY. Top Prices. £ s. d.
Bullocks	8 1 3
Cows	5 7 6
Wethers, Merino	0 17 3
Ewes, Merino	0 10 $6\frac{1}{2}$
Wethers, C.B.	0 18 $9\frac{3}{4}$
Ewes, C.B.	0 15 $3\frac{3}{4}$
Lambs	0 13 $5\frac{1}{4}$
Baconers	1 14 0
Porkers	1 7 6
Slips	0 8 $2\frac{1}{4}$

Farm and Garden Notes for September.

Farm.—Keep all growing crops clean, and water when necessary. Strict attention to keeping down weeds as the season verges towards the summer will save much future trouble. Earth up potatoes already growing, and finish planting this crop before the end of the month. Sow maize, sorghum, imphee, prairie grass, yams, sugar-cane, tobacco, pumpkins. Plant sweet potato vines, making the cuttings from 8 to 12 inches in length; plant in ridges with a dibble, being careful to press the soil firmly round the plant. Coffee, arrowroot, ginger, and yams may be planted out.

Kitchen Garden.—This is one of the best months for general cropping, the ground being now warm enough to sow most of the summer vegetables. Sow largely of almost any such vegetables. It is a mistake to suppose that most European vegetables cannot be grown to perfection during our hot summer. With the necessary care and attention, most of them will succeed. Shade, water, cultivation, and mulch will work wonders in the vegetable garden all through the summer. Sow Lima beans in rows from 2½ feet to 3 feet apart for the dwarf kinds, and 6 feet for the climbers. This bean revels in warm weather, and is an excellent summer vegetable. Plant out rhubarb, Jerusalem artichokes; seakale, and asparagus. Transplant cabbages, cauliflowers, eschalots, &c., for succession. Melons, cucumbers, vegetable marrows, custard marrows, chokos, tomatoes, and egg-plants may be sown as well as rosellas. Sow also French beans and runner beans, such as the Madagascar. Beet, cabbage, carrot, spinach, celery, peas, and turnips will well repay liberal sowings. Capsicums should be planted out and fresh sowings made. Water asparagus beds. Keep the crops clean, and manure with liquid manure. It is a good thing to sow a little salt in newly-dug beds, as it checks too exuberant growth and helps to keep away noxious insects. Too much salt, however, will destroy the fertility of the soil.

Flower Garden.—Plant bulbs as in August, and protect the plants from cold, westerly winds as much as possible. Place dahlias in a moist corner so as to encourage them to start gently. Keep a good lookout for slugs, and, if you have a few toads in the garden be careful to encourage them, as they are most useful helpers in the garden and in the bush-house. They are ugly animals, but are perfectly harmless. Fill up all vacant places with herbaceous plants. Sow zinnia, gailliardia, amaranthus, coxcomb, balsam, sunflower, marigold, cosmia, summer chrysanthemum, coreopsis, portulaca, mesembryanthemum, calendula. Put in coleus cuttings, as well as cuttings of all tropical plants. Disbud roses to save future pruning, and stake up all well-grown bulbous plants.

Orchard Notes for September.

By A. H. BENSON.

The planting and pruning of all deciduous trees should have been completed even in the coldest districts by the end of August, and during the present month the orchardist should disbud and thumb-prune the young trees as soon as they start out into growth. Judicious thumb-pruning is necessary in order to reduce the number of branches, only those buds being allowed to develop into branches that will be required to form the future head of the tree, all the rest being either removed or, better still, pinched back and converted into spurs which will eventually bear fruit and which, meanwhile, will produce a tuft of leaves that will tend to strengthen the branch and to protect it from sunburn. Spraying should be continued during the month in the case of deciduous trees attacked by fungus diseases, such as the shot-hole fungus or rust of the apricot and the Windsor pear blight of pears, the material used being Bordeaux Mixture. Where leaf-eating insects of any kind are troublesome, a little Paris green—1 oz. to 10 gallons—should be added to the Bordeaux Mixture, the spraying material being then both an insecticide and fungicide, and two pests are destroyed by the one spraying. Vines that have not been treated for black spot, as described in the Orchard Notes for August, should be treated at once; and vine-planting should be done during the beginning of the month, though if the cuttings have been kept in a cold place planting can be continued all through the month. In planting grape-cuttings, see that the cutting is always planted firmly, and that the soil comes into direct touch with it all round, as, if not, it is very apt to dry out. Plant the cutting with the top eye just on a level with, or rather slightly below, the surface of the ground, not with 6 inches or more of the cutting sticking out of the ground, as the nearer to the ground the main stem of the vine starts the better the vine will be, and the easier will be its subsequent training.

Orange-trees will be in full blossom during the month, and in the earlier districts the young fruit will probably be ready to treat for Maori or rust towards the end of the month. Maori is caused by a very small mite, which begins its attack on the young fruit when it is about the size of a marble, though the injury it causes is seldom noticeable till the fruit begins to ripen. Spraying the trees with a mixture of sulphur and soft soap, or with a weak solution of sulphide of soda, or dusting the trees with fine sulphur will destroy these mites. During the end of the month pineapple and banana suckers may be set out during favourable weather in the earlier districts, but it is not advisable to plant out too early, as they do not root readily till the soil is thoroughly well warmed. Orchards and vineyards should be kept well cultivated during the month, as if there is a dry spring the success of the crop will depend very much on the manner in which the orchard is kept, as the better the orchard is cultivated the longer it will retain the moisture required by the trees for the proper development of their fruit. Quickly-acting manures, such as sulphate of potash, sulphate of ammonia, and superphosphate, can be applied to fruit trees during the month if there is any suitable showery weather, but should not be applied during either a very dry or very wet spell. Fruit trees should be mulched, and when cow-peas are required for mulching they can be planted towards the end of the month.

During the month a careful examination should be made of all fruit to see if any contains larvæ of fruit fly; and if such are found, they should be destroyed, as if extreme care is taken during this and the two following months to destroy the larvæ of all fruit flies, whenever and wherever found, this great curse of the fruitgrower would be greatly reduced, as it is on the careful destruction of the earlier broods of flies that the saving of the main crop of fruit will principally depend. Though the first damage caused by the flies is comparatively insignificant, they reproduce themselves so rapidly that a few mature insects in the beginning of the season become many thousands before it closes.

Agriculture.

AGRICULTURAL EDUCATION FOR WOMEN.

By HENRY A. TARDENT,
Manager of the Biggenden Experimental Farm.

In season and out of season, the writer of these lines has tried to attract attention to the fact that there are branches of farming perfectly suitable for women. He knows also that, so far, he is swimming against the current, and, like the prophet of old, preaching in the desert. Many people who think it perfectly legitimate to keep a servant, shop, bar, and factory girl hard at work, and for long hours, would consider it debasing to let their daughters pick strawberries, pluck and grade fruits, look after the dairy, poultry, apiary, &c. The only argument used to justify such a prejudice is that women are not fit for farming—that it is not an occupation suitable for them.

And then, what do we not seldom see? A husband dies, and his widow is compelled by circumstances to take in hand the management of the farm, and ninety times out of a hundred the farm is better managed than before.

The woman is present everywhere. She has an eye to details; and in farming it is details which save the whole. She has a keen eye to business, allowing nothing to be lost or wasted, and getting usually the highest price for her products.

In a firm but gentle and pleasant manner she directs her boys and girls, and the farm hands of both sexes, often making of them excellent all-round workers.

When she goes to town she transacts there her business first—like the proverbial early bird which catches the worm—and comes back home at once without stopping at every pub. on the road, to waste there both time and money.

Such facts, which are, I am sure, within the knowledge or recollection of every reader, should, it seems, thoroughly explode the notion that women are not fit for farming. It goes without saying that nobody would expect a woman to go into the field, and there do the ploughing, harrowing, and such like.

But there are many works about a farm which can be done, and are often better done, by women than by men. The question of women's work and living is perhaps more important than women's franchise, so much talked of at the present time. In this country a great many openings which belong legitimately to women have been encroached upon by men. Men sew ladies' dresses and corsets; they sell ribbons and laces in fancy goods shops. Such an arrangement is not only detrimental to the development of manliness, it is a waste of our national resources and strength, and places us in a state of comparative inferiority as regards other nations. The only openings left to a girl who has to earn her living are a few appointments as school teachers in the already overcrowded Educational Department, or she must become a servant, a shop, bar, or factory girl.

Those professions, respectable and useful as they are, do not seem to develop in women the qualities of the mother and housekeeper—the two most natural and congenial of their callings.

The problem, which is only in an incipient stage here, is occupying the attention of economists, philanthropists, and statesmen in other parts of the world.

Those who have travelled on the Continent have had an opportunity of visiting the splendid schools where women receive a complete education in agriculture and household economy. They have admired the nice little vegetable and flower gardens, and the poultry, dairy, and bee farms kept by neat women, who are in good health, thriving, and as happy as larks.

According to the *Neeva* (the *Field*) and other Russian agricultural papers just received, the vast empire of Russia is also busy trying to find a solution to the same question.

There, for centuries past, manual labour had been considered by the noble as debasing and good only for serfs. But those foolish and obsolete notions are on the wane. Some thirty years ago the great Tsar Alexander the Second emancipated some 30,000,000 of serfs by a stroke of his mighty pen. One-half of the land held by the nobles was then taken from them and handed over to the liberated serfs. Such a diminution of their estate induced the nobles to the study of how to apply science to life in general and especially to farming. Now the Russian nobles of both sexes receive an education which compares favourably with that of any other country in the world. Women were soon enabled to supply a large proportion of the teaching staff of the country, also of the post officials, telegraphists, typists, and other similar occupations in which they are admitted on an equal footing with men. Still this was not sufficient.

Many highly educated girls of good family remained unemployed, whilst there was a great demand for good housekeepers and lady managers on country estates.

The Russian Imperial Society for the Development of Agricultural Education took the matter in hand at the National Congress they held in Moscow at the beginning of the present year. The Government had prepared the ground by publishing a sort of blue-book containing all possible information and data on the subject.

From all parts of that vast country there is a cry for ladies with an agricultural education. It is not mentioned whether bachelors have been consulted on the subject. But we can take it for granted that their opinion has been fairly summed up in the following words by Professor J. A. Stebut, who is at the head of the movement:—"A woman acquainted were it only with one branch of agricultural economy can fulfil a treble purpose. She can lighten the weight of her husband's task, being in the full sense of the word his friend and companion, sharing in all his works and cares; she can economise important sums now being wasted through ignorance and mismanagement; and last, but not least, she would fill her life with intelligent pursuits and preoccupations, becoming a useful and integral member of the community."

Professor Stebut has met with a great and enthusiastic support amongst Russian women. In many places private ladies had already founded schools of rural and domestic economy for ladies. The one established a few years ago in the province of Kovno, by the Baronesse A. J. Budberg, can be taken as an example. It is divided into two sections—one for the girls of the peasant class; the other for what we would call here society ladies, be they married, unmarried, or widowed.

The peasant girls are being taught vegetable and fruit growing, rural economy, and agriculture.

The so-called higher course of the institute for ladies comprises a three-years' curriculum. First year: Cattle-rearing, dairying, butter-making, and the making of eleven different kinds of cheese; swine rearing and feeding, poultry-farming, gardening, vegetable and fruit growing, the cultivation of pot plants and flowers; washing and ironing; spinning and weaving; sheep rearing and feeding; the naming and cutting up of killed meat; the preparation of simple and more complicated food; the dressing of the table, and special dressing of tables for extraordinary occasions; candle, soap, and starch making; the preparation of all sorts of jams and jellies, the drying and preserving of fruits, &c.; beekeeping; also reading, writing, arithmetic, bookkeeping, and two languages. Second year: Mother tongue, letter-writing, bookkeeping; elements of hygiene; first aid in case of accidents; the nursing of sick and wounded; elements of veterinary medicine; linen washing and ironing, more especially of fine linen; preparation of local and foreign kinds of cheese; the salting and smoking of meat, sausage-making, &c.; the preparation of all sorts of preserves; and cake-making.

Plate XLI.

AGRICULTURAL EDUCATION FOR WOMEN IN RUSSIA

Ladies efficient in the above subjects can complete their technical education by getting lessons in the growing of ornamental trees and landscape gardening botany, zoology, scientific poultry and bee keeping, chemistry, mineralogy, and drawing. All those theoretical subjects are accompanied by practical work and demonstrations.

At the expiration of three years the pupils are severely examined, and, if found efficient, they receive a diploma to that effect. The fees are £20 (200 roubles) per annum, which include board, residence, and lessons.

Were our squatters', farmers', and citizens' daughters enabled to spend in a like manner two years in a similar school, it would be difficult to correctly estimate the amount of sound notions, of truly civilising influence, which would, through that channel, penetrate to the remotest corners of our island continent. Is it too Utopian to think that in that direction lies the solution of that vexatious question of female servants? The bread-earning girl would see both her status in the community and her salary raised, whilst the lady employer, especially in the backblocks, would find both pleasure and profit in having at her command skilled labour in the persons of young, well-educated girls who could be to her not only helpers, but true friends and companions.

In any case, I have tried to give in the above lines an idea of what is being done in Russia. I hope to hear of something being done, too, in the country which has in her coat of arms, shining like a gem, the noble word, "Advance!"

Illustration 1 shows the garden and pupils of the Women's Rural Institute of Baroness von Budberg; No. 2, some of the pupils at the back of the hot-house; No. 3, Professor Stebut and his pupils of the Women's Rural School at Petrovsho Razvomovsky, near Moscow.

RATIONAL MANURING.

In our remarks on the above subject published in March last, we dwelt mainly on the value of potash and nitrogen, and stated that a manure containing an excess of nitrogen will unduly increase the growth of leaf and straw at the expense of fruit or grain, and that, in order to avoid such a result, stable manure should always be supplemented by artificial fertilisers containing phosphoric acid and potash. These two ingredients, however, should not be applied during the growing season, as their tendency is to injure the young plants and even the seed. We experimented on a bed of beans by applying these fertilisers when the plants were in full leaf, the result being that all of them rotted off at the surface of the soil. To avoid such a catastrophe, phosphoric acid and potash should be applied some time (several weeks at least) before sowing, in order that their mineral fertilisers may become thoroughly incorporated with the soil. The reason which makes it imperative that phosphoric acid, in some form or another, be applied to the soil is clear enough. All our cultivated plants contain a large amount of phosphoric acid, which is wholly derived from the soil. If the crops are removed either in the shape of grain, fruit, or green forage, then so much of this fertiliser is irrevocably withdrawn to build up the bony structure of the animals to which the crops are fed. Now, most soils are naturally deficient in the supply of phosphoric acid, and what there is, is so slowly available for plant food that it becomes an absolute necessity to supply it in a more readily assimilable form and in greater quantity. Seeing that the bones of animals are made up of phosphate of lime, it was concluded, and rightly so, that ground bones would supply the want of phosphoric acid in the soil. The effects of an application of bonedust were so apparent that it was universally used by cultivators of the soil. When, however, the discovery was made that certain minerals would supply the necessary ingredient, the consumption of bonedust fell off, as it was found that Thomas's phosphate was not only cheaper than bonedust, but

produced better results, and was much quicker in its working. Superphosphates also came upon the scene, and thus bonedust was practically discarded as an agent for replacing the phosphoric acid in the soil. In both these, the latter is very soluble, and is easily absorbed by growing plants. It may be interesting to those who use basic slag, or who see it mentioned in reports of experiments on crops, to know what it is. Steel is made from iron, but if the iron ore contains much phosphorus this ingredient has to be removed, or the best steel cannot be manufactured. It is got rid of by burning to an acid. Subsequently it was discovered that by combining lime with this acid there was produced a substance called phosphate of lime. Now, this phosphate of lime, mixed with oxide of iron and some other refuse, floats on the top of the molten metal in the furnace, and is named basic slag. When it has been removed and cooled down, it is ground to powder, and thus an excellent fertiliser has been obtained from a substance useless to the ironfounder and the steel manufacturer—the waste of one industry becoming the support of another.

This particular Thomas's phosphate combines lime and phosphoric acid in the proportions of four to one, the lime being very soluble.

When bones are converted, by being dissolved in one-third of their weight of sulphuric acid, a superphosphate of great value is produced, a value such that 1 bushel of superphosphate is equivalent to 4 bushels of simple bonedust.

Other superphosphates are the produce of those phosphoric deposits found in the South of England, consisting of masses of broken bones and teeth of prehistoric monsters—gigantic sea-lizards, whales, sharks; and also there are vast deposits of so-called *coprolites*, now supposed to be fossilised excrements of the animals themselves. Thousands of tons of these are annually ground up and converted into superphosphates, for which there is an immense demand in the farming districts all over the world.

However, it is not our intention to give a list of phosphates or superphosphates, but we wish to impress upon agriculturists the absolute necessity of supplying the phosphoric acid demanded by field and garden crops, and of keeping up the supply. Consider what a quantity of phosphoric acid some crops require. Wheat requires 60 lb. per acre; beans, peas, &c., 80 lb.; some oil-producing plants, 90 lb.; and small fruits, 100 lb. Now, these quantities must be replaced, and stable manure alone is unable to furnish them; therefore if heavy crops are demanded from the soil, it follows that an artificial manure, in addition to the stable dung, is imperative. Here is a very clear statement showing the comparative phosphoric value of stable dung and Thomas's phosphate: 100 lb. of hay demands from 1 lb. to 1¼ lb. of phosphoric acid; 100 lb. of stable dung contain only 2½ oz. to 4 oz. of the ingredient, so that it would require 600 lb. of it, at least, to furnish the phosphoric acid for 100 lb. of wheat, whereas, by using the artificial fertiliser phosphate or superphosphate, 100 lb. would be enough for 1,600 lb. of wheat.

CUCUMBER-GROWING AND PICKLE-MAKING.

When almost everyone is so fond of pickles it seems a pity that they are not more generally made at home. They probably would be if so many of us did not have the idea that they were a good deal of trouble, besides being difficult to make. On the contrary, they are easily made, and are well worth the work entailed in preparing them. Any woman, whether she lives in town or country, may just as well have a nice lot of pickles every year as not. A great many cucumbers may be raised on a very small piece of ground if they are properly worked. Last year, besides using a good many for the table when fresh, I made over fifteen gallons of pickles, and only had eight or nine hills of cucumbers.

Growing.—The cucumbers need a warm, rich soil, and should not be planted in the garden until the weather is settled and warm, as they will not thrive until the ground is thoroughly heated.

Almost any good cucumber will make a good pickle. Anyone liking large pickles will be pleased with the results obtained by planting Long Green. It is not strictly a pickling variety, but it grows rapidly, is an excellent producer, and makes a very nice flavoured pickle. Anyone desiring a smaller or medium-sized pickle will be pleased with the White Spine or Green Prolific.

Make the hills 4 feet apart each way. Plant plenty of seeds in each hill, and if more than four come up the extra ones may be taken up, after the second leaves appear, and transplanted in other hills. In transplanting, let as much earth cling to the roots as possible. Plant quite deep in the ground, water well, and cover the young plants with paper for the first day or two to keep from wilting.

Irrigation.—I have had the best success in giving them water in the following manner:—After the plants have become quite strong and thrifty, and show signs of running, I dig a hole, large enough around to hold a quart can, as near the roots as possible. I make some holes in the bottom of the cans, and place them in the holes near the plants. They need not be set more than 2 inches deep—just enough to keep them from turning over. Fill the cans with water every other day. This will furnish plenty of moisture for the roots. Of course they may be watered the same as any other plant if preferred.

Gathering.—Commence to gather your cucumbers just as soon as they are a good average size. After once commencing to gather them, all that are of a suitable size must be gathered regularly, as the vines will stop bearing if the cucumbers are allowed to ripen.

Every other day (while the dew is still on them in the morning is the best time) take a sharp knife and cut them off of the vines about ½-inch beyond the end of the cucumber. If the little stems are not left on, the pickles will spoil. Wash them well, being careful not to bruise or scratch any of them. Any that are not perfectly sound must not be used.

Pickling.—Never use a barrel or crock that has had anything greasy in it, as grease invariably spoils pickles. After draining a few minutes spread a good, thick layer of dairy salt on the bottom of the barrel and begin to lay the cucumbers on the salt, putting them in side by side, until you have a layer of cucumbers, then sprinkle a layer of salt over the row, then another layer of cucumbers, and so on, always finishing with a layer of salt. The cucumbers may be put in whenever gathered, whether there is a full layer or not.

After a time brine will begin to make, and then they must be weighted down, first putting a cloth on the cucumbers. Keep filling in the above manner until you have all you wish, or until the barrel is full. The pickles must be kept under the brine all the time. Put a cloth over the top of the barrel, and then lay the barrel cover on the cloth to keep out dirt and mice.

The pickles will be ready to use in about six weeks. When you wish some, take out about what you think will last for a month, and put them in clear cold water. Keep changing the water every day until the salt is out of the pickles, then put them in a crock or glass jar, and cover them with vinegar. If the vinegar is very strong, it should be weakened a little, as too strong vinegar will eat the pickles and make them soft.

Scum will sometimes form on top of the pickles, but it can be skimmed off as the pickles are taken out, and does no harm. If they are well weighted, the scum will form on the cloth directly over the pickles, and this cloth may then be taken out, the scum rinsed off, then put back again.

Pickles prepared in this manner will keep an indefinite length of time, and anyone once trying them will always make their own pickles, as they can't be surpassed by the costliest ones in the market.—*Pacific Rural Press.*

THE PRICE OF STOCK.

It will be seen from the market reports that the price of cattle and sheep is rapidly going up. All kinds of stores are very scarce, yet the runs depleted by the drought will require to be restocked. Only lately, Mr. Cadell, of Deepwater (N.S.W.), sold 10,000 merino ewes at 20s. per head, and this is significant of the present value of sheep, although it is not probable that such a high price will be obtained in the near future. With regard to bullocks and cows, it is evident, judging by the top prices obtained at the Enoggera Saleyards during the past few months, that a steady rise in price is to be anticipated. Thus the top prices were—

	Bullocks.	Cows.	Merinos. Wethers.	Merinos. Ewes.
	£ s. d.	£ s. d.	s. d.	s. d.
March ...	6 19 4½ ...	4 16 10½ ...	13 2¼ ...	10 0¾
April ...	7 5 0 ...	4 10 0 ...	14 10⅛ ...	10 7½
May ...	7 14 6 ...	5 1 6 ...	14 5 ...	11 2¼
June ...	7 18 9 ...	5 6 3 ...	15 5¼ ...	11 7½
July ...	8 1 3 ...	5 7 6 ...	17 3 ...	10 6½

Crossbred wethers have risen from 13s. 6¾d. in March to 18s. 9¾d. in July, and crossbred ewes between the same dates from 12s. 9d. to 15s. 3¾d.

In August extra bullocks brought £9 10s.; cows, £7 2s. 6d.; extra crossbred sheep, 15s. 9d. to 20s.; and prime lambs went at from 11s. to 13s.

Some believe that prime bullocks will yet reach £15 per head.

During the year 1899, there were forty-seven establishments in active operation for the slaughter of cattle and sheep, and the production of fresh, salted, preserved, and frozen meat, and tallow. At these establishments there were slaughtered during the year 140,815 cattle for preserving, 117,668 for freezing, and 127,983 for boiling down, a total of 386,466 head. In addition to these, there were slaughtered in the various cities and towns of Queensland 103,068 head of cattle, making a grand total of 489,534 head. If we include beasts slaughtered on farms, stations, &c., of which there are no returns, the number will be found to be not far short of 500,000 out of a total of 5,053,836 head of cattle in his colony. 188,271 head were exported. In the case of sheep, there are in the country 15,226,479. Of these, 479,818 were preserved, frozen, and boiled down, 262,753 were exported, and 1,017,728 were slaughtered for home consumption—a total of 1,760,299 head.

Taking the number of cattle in the colony at the end of 1898—*i.e.*, 5,571,292—and comparing it with the number in 1899—5,883,005—the difference in favour of the latter year is 311,713, allowing for those killed and exported, and this number shows the net natural increase for 1899, a very low rate, but fair, considering the abnormally dry seasons obtaining of late.

With sheep the case is different. At the end of 1898 there were 17,552,608 sheep in the colony. At the end of 1899 there were 15,226,479. Add to this all sheep killed and exported, and we get a total of 16,986,778, or 565,830 head less than in the previous year, showing that all natural increase has been lost, and 565,830 head besides.

All these facts being weighed, they point to the inevitable result of a considerable rise in the price of fat and store cattle, and also to a maintaining of present high prices, and even higher prices, for fat and store sheep.

TRAINING COUNTRY BOYS.

By R.D., in the *Australasian.*

Mr. A. N. Pearson, Government Agricultural Chemist, in a paper prepared by request of the Royal Commission on Technical Education, deals with the very important subject of agricultural education for youths who are desirous of adopting farming as a means of livelihood. Mr. Pearson has evidently given a good deal of thought to the subject; and in order to bring his views before the public, I take the liberty of reproducing part of what he says.

He expresses the opinion that in any scheme of training adopted, country youths and town youths will have to be considered separately. "Perhaps," he says, "there is no set system of secondary agricultural education in any country that satisfactorily reaches either of these classes of pupils. On the one hand, very few farmers can afford to send their sons to agricultural colleges; they need them at home to help in the farm work. On the other hand, it is a common remark that agricultural colleges do not turn out many practical farmers. It has, for instance, been a complaint that the majority of graduates of American agricultural colleges seek to become teachers, or turn to some kind of town life. I think that farmers' sons might be reached by day or evening classes held in State schools, mechanics' institutes, or large farmhouses, or other available buildings. Lessons of two or three hours' duration might be given during the farmers' slack season, one day a week, or one day a fortnight, or two days together in a fortnight, or at any interval found most practicable; and by such means a fairly good course of theoretical instruction, combined with practical demonstrations, could be given. It need not be claimed that a complete system of this kind could be introduced at once, so as to serve every country district. But one instructor could serve from four to eight neighbouring districts, the number varying according to the frequency of the lessons; and a beginning might be made by appointing only one, two, or three instructors, and afterwards operations could be extended or curtailed according to experience. As to the nature of instruction to be given, I am of opinion that it should be thoroughly thought out beforehand, and a text-book prepared for the course. In the preparation of this text-book it would be necessary to obtain the co-operation of an experienced educationist, and of the professional officers of the Agricultural Department. The instructors might receive assistance from experts in special operations, who could visit the classes in order to give demonstrations in their specialties. In addition to teaching the principles of agriculture, instruction would have to be given in bookkeeping and surveying for farm purposes. A course of instruction such as above suggested would not give farmers' sons a complete agricultural education; but it would be a great advance on the present position, in which they receive no instruction. I would strongly urge the advisability of some tentative work in the direction here indicated. After such a course as this, farmers' sons would be in a position to profit by the higher class instruction to be obtained at an agricultural college, if they desired it, after learning the simpler manual labours of a farm. After his college course he would be fitted to take a subordinate place in the management of a good farm, and with the experience there gained should be competent to successfully manage a farm for himself. This is what I should consider a suitable training for my own son, and with my knowledge of the country, I could select a suitable farm both for the first apprenticeship and for the finishing experience. But every town parent has not this necessary knowledge. I would, therefore, suggest that the selection of suitable farms be undertaken officially by the central educational authority, which should also arrange the conditions for the reception of apprentices at these farms, prescribe the instruction to be given, and periodically inspect and examine as to progress."

TRAINING TOWN BOYS.

"Now, as to the town boys," Mr. Pearson goes on to say, "I am decidedly of opinion that it would be better not to send them straight from town to an agricultural college. A town boy should begin his country training at about the age of fourteen or fifteen. If an agricultural college is to receive boys of this age, its whole course of instruction must be elementary enough for the mental grasp of such boys, or else it must be extended so as to include both elementary and advanced work. If it be so extended, the course must be inordinately lengthened—that is to say, must not be less than four years, and the accommodation and the teaching staff must be increased. In any case it is necessary that the course of instruction at a college should either include or be supplemented by work on a farm conducted in the ordinary way as a paying business.

There is, of course, nothing to prevent a portion of the college lands being set apart to be worked as an ordinary farm; but there would be greater choice of variety if there were farms in different districts to which youths could be sent for this kind of training. The original intention of the Council of Agricultural Education, so far as I understand it, was to establish in different parts of the country three or four farm schools for elementary agricultural education, and a central college for advanced work. That appeared to me a logical scheme. The Dookie establishment was at first named a farm school; but the Agricultural Education Act made no provision for schools, but only for colleges, and the Dookie school had to be renamed a college, and has since been developing into a college. At present it has the difficult task of carrying out the functions of a farm school, agricultural college, experiment station, stud-farm, seed-distributing station, &c. At present there are no farm schools in the colony. If the original programme—so far as I understand it—of the Council of Agricultural Education were carried out, this want would be met. But, in the absence of such provision, I should, if I wished to send one of my sons to learn farming, first of all place him for two or three years on a good farm, where he would learn the elements of ordinary farm work, and acquire that habit of managing animals which comes from early association with them. I should prescribe a certain amount of bookwork for him to do in that time, arrange with the farmer to have this attended to, and examine the boy periodically to make sure of his progress. After the boy had completed this short apprenticeship he would be of an age to profit to the full extent from the theoretical courses at the Dookie College, and would not need to spend a great portion of his time there in going through the drudgery."

VICTORIAN WHEAT EXPORTS.

Not only does Victoria export wheat to the British markets, but she has also exploited the market of Barcelona in Spain. The British Consul there, in the course of his remarks on the necessity for importation into that country owing to the shortage of the Spanish harvest, says—

"The price of wheat in Russia (the market whence it is usually imported) being exceedingly high, a new experiment was tried—that of bringing grain from Australia and New Zealand. During the year twelve large steamers came direct from those countries, bringing about 50,000 tons of wheat. The grain was all in bags, and delivered in good condition, and realised, I believe, very fair prices. Some 10,000 tons of Australian wheat was also imported by indirect route, *viâ* Hamburg and London. I am informed that the flour produced from this wheat is mostly of excellent quality and quantity, as white as the best Castillian wheat, and somewhat stronger." [Several cargoes of the wheat were sent from Victoria to Barcelona.—Editor *Q.A.J.*]

THE CHEAPEST FORM OF NITROGEN.

One of the best authorities on the value and action of sulphate of ammonia and nitrate of soda on certain crops, Professor Warrington, writes to the quarterly *Journal* of the Royal Agricultural Society, England, as follows:—

NITRATE BEST FOR LIMEY SOIL.

1. On land containing no carbonate of calcium (or, in other words, lime), sulphate of ammonia cannot be profitably used as a manure, though nitrate of soda may.

2. On land containing a large amount of carbonate of calcium (lime) sulphate of ammonium will seldom give its best result if applied as a top-dressing. On such land the proper course is to cover the manure with soil by the plough, and harrow it immediately after being distributed over the surface.

3. Though sulphate of ammonium may often be successfully used as a top-dressing upon ordinary land, it gives its best return when it is ploughed or harrowed in before sowing the seed. It is thus specially suitable for application to spring corn and potatoes.

4. Ammonium salts do not become available as plant food till they have become converted into nitrate of calcium. This nitrification will not take place in a dry soil, but in most arable soils it will speedily occur in showery weather.

5. Nitrate of sodium, being immediately available as plant food, and distributing itself in the soil more rapidly than the nitrate of calcium arising from the nitrification of sulphate of ammonium, this manure is generally more suitable for use as top-dressings to growing crops and for late applications.

SULPHATE HAS THE MORE GRADUAL EFFECT.

6. The effect of sulphate of ammonium is always more gradual than that of nitrate of sodium, and is especially prolonged in soils containing little lime, and in old grass land, or when associated with organic manures. This implies a more gradual or a longer continuance of growth in the crop receiving it, and results in some cases in a better quality of produce.

7. The character of the climate or season frequently determines whether nitrate of sodium or sulphate of ammonium will be the more profitable manure. In a dry season nitrate of sodium always gives a better return for the same quantity of nitrogen applied, while in a wet summer the advantage is frequently with the ammonium salt. This influence of climate is most clearly seen in the case of cereal crops, or on grass land; it is less perceived in the case of crops like potatoes and mangels, which have a long period of growth.

8. The greater crop frequently given by nitrate of sodium is in part due to the soda which it supplies, the soda acting beneficially both in the soil and in the plant.

PRODUCE YIELDED.

9. The produce yielded by sulphate of ammonium is more dependent on the presence in the soil of an abundant supply of cinereal plant food than is the case when nitrate of sodium is employed. Kainit is an excellent addition to sulphate of ammonium.

10. On an average of ten series of field experiments with cereal crops, continued throughout many years, in which equal quantities of nitrogen in the forms of nitrate of sodium and ammonium salts were applied to soils well supplied with potash, soda, and phosphates, the average return in corn was 93 by ammonium salts for 100 by nitrate of sodium, and in straw 79 by ammonia for 100 by nitrate. The return in corn is thus not very different by two manures, but the return in straw is considerably larger when nitrate of sodium is used. The quality of the corn was a little better where ammonium salts had been employed.

SOME FIELD EXPERIMENTS.

11. In three series of field experiments on grass hay, conducted in the manner thus described, the average return by ammonium salts was 85 per cent. of that given by nitrate of sodium, when the first cutting of hay was alone considered. When the second cutting of hay was included, the return by ammonium salts was in two series of experiments 88 per cent. of that given by the nitrate.

12. In the first ten years of the Rothamsted experiments with potatoes, the produce by ammonium salts was on an average fully equal to that yielded by nitrate of sodium. No dung was used, but alkali salts and superphosphate were applied.

13. The weight of mangel roots yielded by ammonium salts during seventeen years at Rothamsted was on an average only 76 per cent. of that yielded by nitrate of sodium; but when the superior quality of the roots grown by ammonium salts is taken into account, the return by the ammonia is probably 82 per cent. of that given by the nitrate. No dung was used, but alkaki salts and superphosphate were applied.

FARM EXPERIMENTS IN SCOTLAND.

14. The farm experiments made on turnips in Scotland and the north of England, with small quantities of sulphate of ammonium and nitrate of sodium generally do not show any considerable difference in the effect of these two manures.

15. Sulphate of ammonium of average quality will contain 24½ per cent. of ammonia. Nitrate of sodium of 95 per cent. purity will contain nitrogen equivalent to 19 per cent. of ammonia; 19 lb. of sulphate of ammonium will thus supply as much nitrogen as 24½ lb. of nitrate of sodium.

16. If the nitrogen in the two manures produced the same effect on crops, their money value would be determined simply by their contents in nitrogen. Thus when nitrate of sodium was £8 a ton, sulphate of ammonium would be worth £10 6s. Under various circumstances already described, the nitrogen in sulphate of ammonium is sometimes as effective as that in nitrate of sodium, and sometimes gives a smaller return.

MALT IN QUEENSLAND.

At the time of the late Toowoomba Show, Mr. F. J. Paterson courteously invited us to inspect his malting-house, an invitation we gladly accepted. Mr. Paterson explained every part of the process to us, reserving probably a few trade secrets, and stated that malt could be produced in the colony every bit as good as the imported article, provided only proper care was exercised in the field, the stack, and the threshing machine by the growers. In an article written by that gentleman, printed in the May number of this *Journal*, clear instructions are given for the production of a crop of perfect malting barley, and, as will be seen by the statistics relating to this crop, the enterprise shown in erecting the malting establishment alluded to, has stimulated the farmers to increased activity in this direction. The area under malting barley has increased from 1,953 acres in 1898 to 6,011 in 1899. The average yield has also risen from 13·78 bushels per acre to 16·64 bushels. The total yield for 1898 was 26,917 bushels, and in 1899 it rose to 100,027. The greater portion of this crop was grown in the western portion of the Southern district, round Toowoomba, Warwick, Highfields, Allora, &c.

Large quantities of malt are imported into Queensland. During the past year 127,469 bushels came in valued at £44,148.

Besides this there were 57,934 bushels of barley worth £10,959 imported, and presumably much of this was malting barley, although the Customs only return 15 bushels as malting barley, which is clearly a mistake. Why should not this large sum of money go into the pockets of the farmers and Queensland maltsters?

The former have the best of soil, as a rule they have a reasonable rainfall, and probably insect pests are no worse or more numerous than they are in European and American barley and wheat districts. There is plenty of harvesting machinery available, and certainly there is no lack of intelligence amongst the farmers to enable them to produce as good a malting barley as any imported. The demand for malt is constantly increasing. The twenty-four breweries in the colony brew over 5,500,000 gallons of beer annually, yet the quantity of malt used has decreased, when it should be constantly increasing, probably owing to the fact that the Queensland malting barley grown up to the present has not been of sufficient good quality to make into malt. Even had the whole of the barley grown for malting been treated and used by the brewers, it would not have met by nearly one-half the requirements of the brewers. As may be judged from the fact that during 1899, 62,271 bushels of malt were made in Queensland, 19,420 being made from barley locally grown, and 42,851 from imported barley, whilst the united breweries used 181,092 bushels.

HINTS ON PURCHASING SHEEP.

As a large number of sheep will have to be purchased to replace the enormous losses in the Western country, it will be advisable to take note of the following advice given by a well-known pastoralist visitor at the late Exhibition :—

"First, let there be pronounced masculinity in the male, and femininity in the female. Sheep should be neither sexless nor characterless. They should bear the stamp and character of the breed they represent. This breed character is a mark of good blood, and it should be manifest in no unmistakable manner. The sire should be impressive, resolute, and of noble bearing. He should be distinctly the head of the flock in every sense of the word. To meet these requirements he must have good constitutional and vital powers. Without these no animal is fit to head a herd or flock. In selecting a sire, look first at the head. If deficient there, look no further, but reject at once. Insist upon a head that faces you boldly, with a wide face, a clear, prominent eye, and a robust character throughout. The head should be joined to a well-filled, round, muscular neck, wide at the poll and back of the ears, gradually enlarging in all lines to a strong, full junction at the shoulder, as seen from top, sides, or bottom. This should be accompanied by a wide chest, a prominent, well-filled brisket, and a full heart girth, giving straight, even lines from the shoulder back. A depression either in front or behind the shoulder, whether at the top side or bottom line, is an indication of weakness. The back should be strong, wide, and well meated from shoulder-point to tail. The hindquarters should be full, and well let down in the leg and flank, in order to yield well of high-priced meat. The legs should be placed wide apart and stand straight; sickle-shaped hocks, and weak, sloping pasterns should afford sufficient reason for condemning an otherwise good sheep."—*Country Life.*

ELECTRICITY APPLIED TO AGRICULTURE.

In Germany considerable attention is being devoted at present to the application of electricity in agriculture. One of the most recent movements in this direction is the formation of a syndicate in the district of Ochsenfurt, Bavaria, for the establishment of an electric system for use in agricultural work. The current will be furnished by a central station, which will use hydraulic and steam power; the distribution of current will be made at high potential, 5,000 volts, to the territory where it is to be used. On each farm will be located a sub-station, provided with a distributing switchboard, and the current will be utilised to operate threshing machines, root-cutters, crushers, &c., &c. The electric motors are of simple construction, and sufficiently solid to stand wear and tear, and are operated without difficulty. The current will be also utilised for the lighting of the villages in the neighbourhood.—*Scientific American.*

GOOD SUGGESTIONS FOR WHEATGROWERS.

The Indiana Experiment Station, U.S.A., has sent out the following practical suggestions to wheatgrowers in that State :—

1. As varieties of wheat vary greatly in their adaptation to different soils and climates, farmers should test carefully the more promising sorts, and choose only the best.

2. Sow only large, sound, plump seed, free from smut and other impurities.

3. Sow neither very early nor very late, but at a medium date.

4. If, however, early sowing is necessary, sow thin; if late sowing, increase the quantity.

5. Adopt some form of crop rotation or fallowing that will tend to rid the soil of weeds, wild oat, &c., and bring it into proper condition to produce a healthy and vigorous development of the wheat crop.

6. As the effects of artificial fertilisers vary very greatly on different soils and under different climatic conditions, every farmer should carefully experiment with and study his own soil, compare notes with his neighbours, and thus learn by experience and observation the kind and quantity of fertiliser that will give the best returns on his own land.

THE MANURE HEAP.

WHAT MAY BE LOST BY INCOMPETENT MANAGEMENT.

It is of the utmost importance to retain all the fertilising elements of the manure heap. In spite of the knowledge gained by experiment of the losses which accrue from an ill-protected manure heap, it is to be feared that much yet remains to be done before farmers are brought to a knowledge of the appalling loss that takes place annually through careless and indifferent management. Experiments have been made to compare exposed and unexposed manures. It was demonstrated that there is a greater loss of nitrogen and organic matter from exposed manure than from that protected. The former lost one-third of its nitrogen and the latter about one-fifth. Ten per cent. more organic matter was destroyed in the exposed than in the protected manure. There is practically no loss of potash and phosphoric acid from protected manure. Exposed manure that is rotting may lose about one-sixth of its phosphoric acid, and somewhat more than one-third of its potash. The chief changes, due to fermentation, take place within the first months of rotting, and experiments show that there is no apparent benefit in rotting the manure longer than for a period of three months. When gypsum was used, 3 tons of horse and cattle manure, mixed in equal proportions, were allowed to ferment without the addition of any preservative, by way of comparison with an equal weight of the same kind of manure intimately mixed with ground gypsum (land plaster) at the rate of 50 lb. of gypsum to every ton of manure. These lots were fermented at the same time, in separate bins, inside of a building, the manure being fresh and compacted as closely as possible, being undisturbed for four months (July to November), when they were weighed and analysed. The results showed that gypsum retarded, to a certain extent, the destruction of animal matter. The amounts of nitrogen in both lots were the same, no useful result from the application of gypsum being observed. The proper place to use gypsum is in the stable, as it is in the stable that a great loss of ammonia occurs.

MANAGING THE HEAP.

When manure is kept moist, the loss of potash cannot be prevented without a water-tight, non-absorbent floor, but when the manure heap is kept compact and moist there is not any considerable loss of ammonia. It is evident that if manure is exposed to rains, no matter what the absorbent materials may be, the water cannot pass down without carrying soluble matter with it, and when the water reaches the bottom it must either go down into the ground or flow off in some direction. Whatever substance has been dissolved out of the manure remains in the water and passes off with it. The remaining materials of the heap may be almost worthless, but they receive just as much attention, and as much labour is bestowed in hauling and spreading the substances as though the loss of soluble matter had not occurred. It has been shown that when manure is compacted, and the air kept out, the fermentation of the mass is not so rapid, but when loosened and the air admitted, fermentation begins, because the oxygen of the air influences chemical action. When manure is under shelter the rains do not dissolve the plant food from the heap, and when the liquid manure is thrown upon the solid portions by pumping or otherwise, the solids

become absorbent and assist in retaining the liquids. All locations for manure should have water-tight bottoms, for then any accumulation of liquids can be retained and added again to the heap, and tanks should be arranged into which all liquids from the stable should flow, so as to save the soluble matter. If the heap is then too wet, more absorbent material of some kind should be added.—*Farmer and Stockbreeder.*

SHEEP-CLASSING AND STUD-BREEDING.

By J. S. HERMANN SCHMIDT.

Sheep are classed for the purpose of collecting, into certain lots or flocks, animals similar to each other in qualities, whether good or bad.

Referring in the first instance especially to females, it is intended, by classing, and by then mating them with suitable males, to correct, in the generations to come, certain faults and deficiencies.

Such improvements may be effected by a simple process of amalgamating extremes, or by bringing to bear upon the females the preponderating influence of the blood of higher-bred males.

In order to mate animals so as to accomplish the desired improvements, we must take into consideration the genetic tendencies of both the males and the females—*i.e.*, the kind of blood prevalent—whether the existing types are fixed or not; in what direction the genetic tendencies are likely to work; whether the animals at our disposal are likely to throw back to the types of inferior ancestors, or whether we have reason to expect that, on the contrary, more desirable types are likely to turn up.

Without being able to form anything like a correct estimate of the average qualities of the ancestors, we are bound to grope more or less in the dark.

Fortunately there are indications present in almost every flock that serve, so to speak, as landmarks, and, unless these are carefully noticed and their meanings correctly interpreted, we cannot hope to accomplish anything like fair results at an early stage.

These landmarks are noticed partly in the physiognomic peculiarities of the head, partly in certain characteristics of the fleece, and in the frequency with which they occur right through the flocks.

The race types or family features of the ancestors of sheep are recognised in the formation of the skull, the shape of the nose, the mouth, the lips, the expression of the eye, &c. Other race types may be traced in peculiar characteristics of the wool, not from the manufacturer's, but from the breeder's point of view. A certain type of wool, which a manufacturer would pronounce as perfection, may be, to the breeder, very unwelcome, as proving to him that his sheep will not yield to the influence of certain males. We can tell the presence of negro blood in many almost white-skinned descendants from negroes, by traces of that short, curly hair characteristic to the negro race. In the same way we can tell the presence of the blood of English long-woolled races by a peculiar glossy brightness of the wool, by the want of density and elasticity, by a tendency to a very marked waving and the more or less flattened arrangement of the single fibres into a staple. We also notice peculiar lines of demarcation in the fleeces of some sheep by which we can tell that we have to deal with sheep that have the blood of much coarser-woolled ancestors in their veins.

These peculiarities cannot very well be explained in words, but they exist, nevertheless; they are worthy of notice, and should be carefully searched for and studied in the yards.

The principal object of sheep-classing is, therefore, to arrange the sheep into certain flocks, according to the qualities of their fleeces, so as to be able to mate them with rams who, by virtue of their own qualities, are likely to produce better sheep in the coming generations.

There are cases, however, in which classing is done for different purposes. A woolgrower may simply wish to throw out the least profitable sheep, so far as their fleeces and their general constitution are concerned, in order to utilise the pastures by more paying grass-consumers. This would be, in reality, nothing else but "culling" or "throwing out the worst." Moderately fair sheep may also be thrown out, because their fleeces, being of a different type than those of the majority of the sheep, would render the clip uneven and difficult to class.

In most cases, however, classing will be done for the purposes mentioned above—viz., to get all the sheep that carry the same faults in their wool in one flock or one paddock, so that they might be mated with rams, especially fitted to correct their faults in the generations to come.

The classes will have to be made up according to the following considerations, viz:—1. The length of the staple. 2. The density of the wool fibres. 3. Their trueness as indicated by the character of the staple and the formation of its tops. 4. The degree of fineness of the wool, its softness, elasticity, &c., or any prominent faults prevalent, and bareness generally, &c.

Besides these particulars there are many other points that are imperative in anything like stud sheep, such as the characteristics of purity of race, in opposition to crossbreeding; of family likeness, as a guarantee of the power of transmitting already alluded to, &c.

For practical classing the following system will have to be adopted:—Sheep will have to be grouped in the first instances into very long and very short woolled ones. The very shortest and the very longest, especially if the latter are coarse and wiry, will have to be thrown out straight away, and the remainder will probably represent themselves in some of the following classes:—

I. LONG-WOOLLED CLASSES.

1. Long, open, with character (medium combing).
2. Long, open, without character, wiry and rough (inferior combing).
3. Long, denser, with character, medium fineness (good and medium combing).
4. Long, dense, with character, greater fineness and shafty (prime combing).

II.—SHORT-WOOLLED CLASSES.

5. Short, open, with character, medium clothing (woollen).
6. Short, open, without character (inferior clothing).
7. Short, dense, with great character, more or less fineness, dividing freely into very fine shafts (superior clothing).
8. Short, dense, without character (fair clothing).

Sheep with mushy, curly, untrue fleeces, &c., should be culled.

These classes represent, as nearly as possible, most of the characters we generally meet

There are likely to be found flocks that are coarse and mushy right through; others are open-woolled and curly, &c. I have frequently found that one special fault is so prevalent right through the flocks that there was no need of any subdivision into special classes, and, whilst the classes enumerated represent about the variety of types we generally meet, it is scarcely necessary to divide a lot of sheep into more than 3-4 classes, viz.:—1, studs; 2, first-class stock sheep; 3, second-class stock sheep; 4, culls.

On most stations it is very difficult to keep several classes of sheep permanently separated, so that really systematic classing, such as it is done in Europe, cannot be carried out here, except on very few stations.

The trouble in levelling down flocks, as nearly as possible, to one standard is mostly found where flocks are periodically mixed with sheep purchased from other stations. By this means undesirable points are frequently introduced right through the flocks, which it takes years of persistent culling to get rid of.

The great object is always to obtain a good stud flock, as a nursery for such rams as are qualified to eradicate almost any glaring deficiency. Heavy culling of the ewes should likewise be resorted to whenever there is a chance of getting rid of surplus stock.

In forming a stud flock it has to be considered whether it is desirable to favour the shorter and denser stapled sheep, or whether it is intended to breed a more pronounced combing. At the same time it is imperative that, in selecting stud sheep, none of the desirable qualities to be produced in the offspring should, at the start, be overlooked. The sooner every important point receives the consideration due to it, the better. To use, at the start, a lot of barebellied ewes and rams, although their backs and sides may be good, would mean to fix in the generations to come a very objectionable fault Stud sheep should be good all over; without necessarily being perfect, they should exhibit indications that the elements for the several desirable points are present, and merely require to be developed. None of the desirable qualities should be entirely wanting. Stud sheep should exhibit no traces of faults that are troublesome to get rid of.

With regard to practical classing, it is impossible to lay down any hard-and-fast rules. Every flock presents varieties of form and qualities peculiar to itself. The general average qualities of the sheep and the pastoral value of the locality will often lead to a decision what to do with this or that kind of sheep. An intelligent sheep-classer will thus have to take many things into consideration before he attempts to make up the classes and to form a stud flock.

It is very important, also, that one does not allow himself to be influenced by certain pet theories, which are often proved to be downright fallacies. It is often stated that such-and-such country is *per se* unfit for sheep; that the faulty description of the sheep on it is the result of the quality of the grasses. Now it must be admitted that, if the grasses are sufficiently nutritious to keep the sheep in good health and condition, good fleeces can be produced by means of those grasses as well as bad ones. There is no reason why any kind of fodder that is capable of producing flesh, bone, and fat in normal quantities should not be able to produce abundance of horny substance—*i.e.*, wool. In ninety-nine cases out of 100 we find that bad fleeces are the result of careless breeding; good health and condition are the results of good food and a favourable climate. I know several runs where, previous to the sixties, some of the finest-woolled and most valuable clips had been grown, but the sheep were delicate and liable to diseases. They were done away with, and replaced by cattle. The probabilities are that somewhat stronger sheep would, even now, when cattle fetch a high price, prove themselves more remunerative on those runs than cattle. Men are sometimes hasty in forming opinions from superficial observations. Some years ago it was commonly reported in the South that the wool of sheep in the North invariably turned into hair. We know that this is not true; the opposite, rather, seems to be the case. The pastures and the climate of the Western and North-western districts have the tendency to favour the development of the highest qualities of the merino wool without producing much yolk. It is possible that the sheep wherewith the districts in question had been originally stocked descended from the culls of Southern Queensland, and were more or less open-woolled, and, producing, as they did, very little yolk on that country, they naturally looked fuzzy and open. Any bad sheep are the result of bad breeding, and it is not correct to debit the grasses and the climate with their deficiencies. From my own observations in several sheds in the North-west of Queensland, I am convinced that, under ordinary circumstances, all descriptions of wool can be grown in that locality, from that of the fine-woolled Saxon merino to that of a Lincoln. I know a manager who imported a lot of rough, crossbreds, or descendants of crossbreds, to a station in the North-west of Queensland, because "fine wool could not be grown there," as he said. As the wool of merinos in the North generally turned into hair, we should follow Nature, and put coarse-woolled sheep there, straight away, without attempting to grow fine wool. What a fallacy in the first instance, and what a conclusion to draw from it. It does not follow that, in country where the sheep appear to have a tendency to grow open fleeces, much more densely packed staples could not be produced there as well as a trifle more yolk.

A similar fallacy is indulged sometimes by people who, for instance, have nothing but short-woolled sheep on their run. As the progeny of these sheep scarcely ever varied towards producing a longer staple, the verdict of the owner is: We cannot grow long wool on this country; look at the sheep—there is not one long-stapled sheep amongst them. The opposite would be just as fallacious—viz., because most of the sheep are long and open woolled, a much denser and finer woolled sheep could not be produced on such country.

The belief in this and similar fallacies, the result of imperfect observation, has often prevented woolgrowers from making improvements that would have turned out most remunerative.

In classing sheep for the purpose of producing in the generations to come the most paying sheep that the run in question is capable of growing, the sheep-classer must first of all disabuse his mind of any such fallacies as I have mentioned. The point always to be considered in the first instance is—What kind of sheep is the run capable of producing? Is the grass plentiful and water permanent and handy? Have the sheep, to quench their thirst, to travel over a great deal of ground? or is there an uncertainty with regard to the supply of both? In the latter case it would scarcely be wise to attempt the growing of a pronounced combing wool of the more substantial sort. A shorter staple wool, with great density, &c., would be grown with more success. Short-stapled fleeces do not suffer in value so much, under less favourable circumstances, than the long-stapled ones. A slight break in a long staple deprives it of its value as combing wool. A thin, fuzzy, ill-conditioned, but long-stapled wool produced on very poor country proves that the grasses are not sufficiently nutritious to produce a long and luxurious staple, such as we require for true worsted yarns. In such cases it will be better to confine one's exertions to the cultivating of a shorter staple with great density and good quality.

In dealing with a decidedly short wool, which may be improved by regularly culling the worst and gradually improving the length of the staple, it is often difficult to procure suitable material for developing the present style into a *bonâ fide* combing, principally because many of our present combing breeds are rather open. Some combing wool breeds, moreover, are tainted with the blood of coarse-woolled sheep, and do not transfer their present qualities when brought into contact with sheep of an entirely different origin. I have always found that the longer-stapled Tasmanians and the pure Rambouillets answer that purpose best, though the progress may appear somewhat slow at first. At the same time, it is often ill-advised—from a strictly financial point of view—to incur great expenses to procure suitable material, because short-stapled wools, if densely grown and of good quality, generally pay well enough; and it is astonishing what good results careful selection will do towards developing the dormant qualities which are present in any flock of pure merino blood. One of the best combing wool breeds in New South Wales has descended, to my certain knowledge, from one of the finest and shortest stapled breeds of Silesia. These, however, had, at the beginning of the 19th century, been derived from pure Spanish merinos, remarkable for the length of staple, the good qualities of their wool, and their big frames.

Within pure merino blood, facilities are present of an almost unlimited development.

I may here give one special instance from personal experience to prove that it is often very risky to attempt to lengthen the staple of short-woolled merinos unless it is done by using material calculated to preserve and not to sacrifice the good points in existence. Density is easily sacrificed, and the greater length obtained, frequently turns out to be no true improvement, so far as the rentability of the sheep is concerned.

On a run, where from the nature of the grasses an excellent combing could be grown, there were, at the time of which I speak, short-woolled sheep of good quality, and fairly dense right through. Some of the sheep were bare and too short, but they were very even in quality and fineness. They were the 2nd and 3rd generation of some valuable Mecklenburg negrettis, and, to all

intents and purposes, pure merinos. Believing that a good combing wool could be grown, the owner wished to cross these sheep with Ercildouns. I use the term "cross" advisedly, because the introduction of Ercildoun blood into these flocks would practically amount to a "cross." I strongly cautioned the owner against so injudicious a proceeding, and I was backed up his brokers, Messrs. W—— and B——. These gentlemen maintained that the sheep now on the run showed every indication of within a few years producing one of the finest clips in Australia, and that the fleeces would make up in price what they might be wanting in weight. The wool could stand lengthening a little, but it should not be done by any of the open-stapled breeds, then so much in fashion. The owner, however, introduced sufficient Ercildoun rams to completely change the style of his wool and ruined his flocks.

Sheep may also be classed on purely genealogical principles. For instance: The stock of sheep on a run has been made up by periodical purchases from different stations. The flocks of one of the stations from which the sheep were obtained, descended from merinos of a distinct type. It is considered desirable to bring out and to cultivate the qualities of that flock. In selecting sheep for the purpose of obtaining descendants in which the pure merino blood should become predominant, the selection would not be done so much by the qualities of the wool alone, but by those racial characteristics which are a guarantee of pure merino blood. This system had to be followed in the early days of fine woolgrowing in all countries into which Spanish merinos were introduced to improve the native sheep. A famous classer used to say: "Wool is dirt, I breed by the faces of the sheep." An expression like this is to be taken, of course, with the proverbial "grain of salt." With regard to the characteristics of a true merino face, it is well known to the older breeders in this colony that the descendants of "Deuchar's Billy" could be traced by their faces for several generations. The system of breeding on what may be called purely genealogical principles and the classing of the ewes according to the more or less pronounced racial characteristics have often been followed with great success. A number of pure-bred merinos is procured, their offspring selected and put back to their mothers or sisters, and fresh importations of pure sires are made until the whole flock on the run carries the characteristics of the imported sires. Here, no selection, in the proper sense of the word, has been done—*i.e.*, for the purpose of obtaining the desirable qualities by amalgamation of different types; the flocks have been "stocked," rather, with pure blood.

With regard to scientific woolgrowing, I am not in the position to recommend such a system, unless a careful selection and classification is adopted at the same time. Undesirable qualities are bound to crop up, even amongst the very best sheep, and, unless they are persistently weeded out, deterioration will follow.

CLASSIFICATION OF RAMS.

As the rams are generally the progeny of what is considered the best ewes on the run, and as these, if systematically selected, should be fairly similar to each other, &c., it may be presumed that, first, the rams from such flocks will produce offspring better than the average sheep of the flocks. The real value of rams, of course, depends, apart from their qualities, upon the length of time during which systematic selection has been practised; whether the good qualities which are now the characteristics of the ram flock are comparatively recent acquisitions, or whether they have existed in the flocks, both male and female, for some time. The excellent qualities of the Tasmanian sheep are, perhaps, more than fifty years old; those of the Gadegast sheep more than a hundred. In some of the Darling Downs flocks it was not until 1863 that attempts at improvements have been initiated.

Any good ram flock should, first, show a certain uniformity in their outer appearance; second, possess the desirable qualities in a strongly pronounced degree; third, should have far greater power of transmitting their good qualities than do ordinary stock rams. At the same time we have to bear in mind that newly selected stud flocks, even if served with thoroughbred rams, do

not, generally, produce offspring as desirable as might be expected owing to the tendency of all domestic animals to throw back. Frequently it is not until after several generations later that the desired uniformity of good qualities and certainty of transmission can be expected. We also notice that some of the best rams do not prove themselves to be the best stockgetters. This has led on the Continent of Europe to the introduction of the system of "Breeding by trial," and which has been followed by very good results.

Any good ram should be perfectly reliable as to his transmitting his good qualities; in fact, any ram should be really good all over, and, if coming from thoroughbred stock, should be capable of producing faultless offspring even with faulty ewes.

At the same time, prominent faults might with advantage be eradicated by rams not singularly good in other respects. For instance, mushy fleeces might be improved by rams of good density and character without their fleeces needing to be highly elastic, soft, and silky. Improvements confined, in the first instance, to density and character ensure, at least, heavier weights—a very important consideration from a commercial point of view. A shafty, long-stapled ram of moderate density and character might usefully counteract a blocky, broad-topped, and very short staple, &c.

On this principle rams are sometimes classified on the Continent of Europe as refiners, condensers, staple-lengtheners, character rams, mass producers, correctors, &c. The employment of rams on such a classification, of course, can only be adopted where the facilities are given of classing the ewes in corresponding classes, and then mating them with rams especially suited for them.

Except in places where stud-breeding is carried on with a view to the sale of stud sheep, and where it has become necessary to watch the development even of the slightest deviation from the ideal type, and where a very careful amalgamation of eccentric deviations in various directions has become imperative, we shall have to confine our exertions to the selecting and mating of the best rams and ewes without attempting to do more than systematic culling of both rams and ewes that are not up to the mark, and to breeding our stock rams from a carefully selected stud flock.

The Points of a Good Ram.

In Australia we have to deal with three more or less distinct breeds of merinos: the French Rambouillet type, as we find it in the Boonook sheep, the American Vermont, and the Tasmanian or Saxon types. These varieties of merinos have descended from Spanish merinos. According to Petri, who has made a thorough study of the Spanish merinos in Spain itself, during a residence in that country for several years at the beginning of last century, the merinos of the various cabannas or flocks differed very little from each other. Even at our times the points of a first-class Rambouillet differ from those of a superior Tasmanian principally in the degree of fineness and density. Whilst the latter are superior to the former in these respects, the Rambouillet has a much larger frame and better fattening propensities generally. The Vermonts carry a very thick skin and produce great quantities of yolk, and they are difficult to fatten.

In determining what should be considered the good points of any Australian merino—*i.e.*, a *bonâ fide* pasture sheep—we have to bear in mind that the flesh-producing capacities of the merino will, year after year, become a much more important feature in the value of an Australian pasture sheep. The carcass of such an animal should be, like that of a good bullock or pig, broad and long in proportion; it should rest on strong, short legs, standing wide apart. With regard to the last point we shall never succeed to gain the ideal proportions—1st, because comparatively long legs are the ancient heirloom of the race; 2nd, because pasture animals travel so much that their legs are constantly, so to speak, training for walking. If we could grow a fine-woolled and heavy merino fleece on such a carcass as that of an English Lincoln, Leicester, or even Southdown, we should have succeeded in producing the *beau ideal* of a perfect wool sheep for Australia.

A first-rate carcass is thus the most important point in a good ram. With regard to the fleece, we require at least the following qualities: 1st, density of growth; 2nd, regularity (stapleness) of the staple; 3rd, elasticity; 4th, softness; 5th, lustre, &c. Great fineness of fibre is not quite compatible with length of staple. The finest wools are inclined to be short. Fineness of fibre is also less appreciated now by manufacturers than it was formerly, and we may sum up the most valuable point of a ram as consisting in the capacity of producing the largest amount of money per lb. living weight.

THE LOGAN FARMING AND INDUSTRIAL ASSOCIATION.

At a meeting of the council of the above association, on 16th July, 1900, the following resolutions were passed, and accordingly copies of them were forwarded to all societies interested, in order that action might be at once taken to give effect to the wishes of those societies in the direction indicated:—

I. That in the opinion of this meeting of the council of the Logan Farming and Industrial Association: "That owing to the assured federation of the Australasian colonies and the possible effects on the producing interests of pastoralists, planters, farmers, dairymen, and others, it would be to the best interests of the agricultural industries of this colony if steps were taken to establish a central council or chamber of industries, to assist, protect, and safeguard the various industries, and to further in a greater degree the objects for which such societies and associations are now formed throughout Queensland."

This was moved by Mr. F. W. Peek, seconded by Mr. A. Kleinschmidt, and carried unanimously.

It was also resolved, "That a copy of this resolution be printed and forwarded to the Minister for Agriculture, asking his assistance in the carrying out of the objects of the resolution; and, also, that a copy be forwarded to each society interested, with a request to them to consider and discuss the resolution at a special meeting called in their respective districts. And that each society or district be requested to appoint a member or delegate to act, or further correspond, with the council of the Logan Farming and Industrial Association, Beenleigh, with the object of giving effect to the foregoing resolutions." Carried.

MATTHEW HOWIE, Chairman.
FRED. WM. PEEK, Secretary.

BEENLEIGH SHOW.

Those who remember the Logan and Albert districts between the years 1865 and 1872 will recall vividly to their minds the activity which prevailed not only in those centres, but also in the more distant Pimpama, Coomera, and Nerang country, at a time when sugar was king. Then there were no large central mills, but every planter of consequence erected a small horse or steam mill for himself, and produced very fair sugar with primitive appliances, and at what would now be looked upon as ruinous cost. Forty to fifty per cent. of the sugar went into the megasse heap, enormous quantities of molasses were made, and firewood was consumed in a manner which to-day would appear to be impossible. But sugar brought a high price, somewhere between £30 and £40 per ton, and the pretty little township of Beenleigh was built on the results. In those early days the township proper consisted of one store; there was not even a hotel, except one small affair—hotel and store combined—with which the name of Michael Tansey will always be associated. The times have changed. Sugar is no longer in the ascendant, only two or three small mills being at work, in addition to the central mill at

Nerang. But for solid prosperity the district is far in advance of the reckless, rollicking old sugar days. Everywhere the land is either under cultivation with the usual farm crops, or else is devoted to the dairying industry. No longer are there huge blocks of land of hundreds and even thousands of acres, with from 30 to 50 acres as the sole cultivation, and troops of kanakas as the main labour employed both in the mill and in the field. The farmers work their own small holdings assisted by their families and perhaps a couple of white hands, and as a rule they appear to be in very comfortable if not affluent circumstances. On all sides are to be seen neat houses and well-cultivated fields; and if the residents are to be judged by the general appearance and jovial demeanour of the 1,500 or 2,000 who attended the show ground on the 7th September, there can be very little *atra cura* or black care amongst him. Of the show itself we have only to say that, considering the late time of the year at which it is held, the committee and their energetic secretary well deserved the financial success in which the show resulted. The exhibits were various, some being of excellent quality, but we still think that if the show were held a month earlier these would be greatly increased in number and condition.

GYMPIE SHOW.

The Gympie Agricultural, Mining, and Pastoral Society, whose show was held on the 12th and 13th September, were unfortunate in the weather. Scarcely had the Hon. J. G. Drake, the Postmaster-General, declared the show open than a drizzling rain began, which soon became a heavy and continuous downpour. Many people were thus prevented from putting in an appearance. The second day was more propitious, and there was a very fair attendance, but under the circumstances not nearly so large as is usual at a Gympie function.

There was not a large quantity of agricultural produce shown, but what there was, was very good, especially maize, potatoes, cabbages, butter and bacon, and eggs. Mr. H. A. Tardent, manager of the Biggenden State Farm, had a very attractive collection of many kinds of produce, displayed as attractively as the corner allotted to him would permit. He also showed several ingenious labour-saving implements of his own construction. Well-bred fowls were greatly in evidence. We believe the entries far exceeded the number of the previous year, and it is much to be regretted that there were so comparatively few to admire the excellent saddlery, mining appliances, and splendid gold quartz shown by, we believe, the No. 2 Great Eastern Company. A very good farm gate was placed in position, of simple construction, but very effective, as it can easily be opened by anyone without dismounting from horse or cart.

WHAT KIND OF MANURE SHOULD I USE?

By J. C. BRÜNNICH, L.C.S.,
Chemist to the Department of Agriculture.

One of the first questions a farmer asks the agricultural chemist is almost invariably: "What kind of manure should I use?"

A question easily asked, and supposed to be as easily answered by the chemist. Unfortunately this is not the case. An intelligent and observant farmer ought to be in a much better position to tell what manures his land wants than a chemist, who perhaps sees the land for the first time, and who possibly has never been in the district before.

Still the question is only a natural one, and shows that the farmer is alive to the fact that his land, in order to produce as good a crop as in former years, requires something more than good cultivation and good seed.

How can a farmer tell what manures his land requires? Is it not necessary to have the soil first analysed?

In the present article I intend to show that the ordinary agricultural soil analysis is not always able to show what the soil really requires, but that simple manuring trials carried out in a careful, and even only on a very small scale, are a far surer guide to the farmer than a soil analysis which he is not able to interpret.

Already in a previous article on "Some Queensland Soils," which appeared in the May number of this *Journal*, I explained the difference between an agricultural and an absolute analysis of a soil, and I also tried to show that even the amount of plant foods given by the agricultural analysis are not necessarily in a readily available form.

An admirable and highly valuable little pamphlet by Dr. Paul Liechti, the director of the Swiss Agricultural Experiment and Test Station at Berne, on the "Rational Use of Artificial Manures," makes the whole matter so clear that I feel it my duty to bring a few extracts to the notice of our farmers.

It is the first duty of every farmer to maintain the fertility of his ground; to increase the fertility, if possible, by better cultivation and careful manuring; and to get a better return from his land.

Of the chemical bodies—carbonic acid, water, phosphoric acid, nitrogen, potash, lime, magnesia, iron, and sulphuric acid, which are all absolutely necessary for the growth of a plant—not all need to be applied in the form of artificial manures, but only those which are shown, by practical experience, to be more quickly exhausted, and which are generally found in only small quantities in the soil, as phosphoric acid, potash, and nitrogen.

Our commercial manures are consequently chiefly potash, nitrogen, and phosphoric acid manures, their value depending entirely on the amount and on the form in which the chemical compounds are found in the manures. For the testing and valuation of such manures the chemical analysis is quite indispensable, and no farmer should dream of buying a manure of which he does not know the exact composition. With the help of agricultural societies, the farmers in Switzerland are enabled to obtain manures under favourable conditions, at cheapest rates, and of guaranteed value.

In Germany the amount of artificial manures used is enormous. Professor Wagner estimates the yearly application of such fertilisers at about 100,000 tons of potash, 300,000 tons phosphoric acid, and 70,000 tons of nitrogen in the form of artificial manures.

In Switzerland the amount of manures used is also very considerable, but not nearly up to the requirements of the soil. Dr. Liechti shows that, for instance, in the Canton Berne, in 1896, about 1,300 tons phosphoric acid, 240 tons potash, and 93 tons nitrogen were supplied to the land, in the form of artificial manure, whereas the average crops grown on the land took out of the soil 12,000 tons phosphoric acid, 41,000 tons potash, 36,000 tons nitrogen. The amount of the important plant foods put back to the land in the form of stable manure amounts to 4,700 tons of phosphoric acid, 24,000 tons potash, and 19,600 tons nitrogen, thus proving that the land was robbed of more than half of its most valuable ingredients.

If this happens in a country where agriculture has reached a high perfection, how much more disastrous must be the result of such cultivation as practised in our colony. It is only due to our comparatively young and rich soils, and to our favourable climatic conditions, that the result of reckless cultivation without manuring has not become more apparent.

Some of our farmers have manured, but it was done in a blindfold and reckless manner. The farmer purchased, perhaps, a few bags of meatworks manure, superphospate, guano, and applied them alone or mixed without getting any result; and of course very wisely abandoned further trials. Such unsatisfactory results have only to be expected if the old law of "Liebig," which still holds good, has not been understood, and has not been put in practice when manures were applied.

Liebig stated: "The production of a plant crop on a given area depends on that plant-food which is available, in proportion to the requirement of the crop, in the least quantity."

Professor Dr. P. Wagner states in one of his works*:—"Nitrogen alone can produce no leaves, stalks, or ears, if no phosphoric acid is present. From phosphoric acid alone the plant can form no grain, if not nitrogen and all the rest of the necessary plant foods are available in sufficient quantities. If manuring with nitrogen produces a luxuriant growth of leaves, this is not only due to the nitrogen, but also to phosphoric acid, potash, and lime, changed into abundant valuable plant foods by the addition of the nitrogen. No change in the development of the growth would be visible by manuring with nitrogen, if not sufficient phosphoric acid would have been originally present in the soil."

The same author explains this law in a more popular form:—"One pound of sulphur by itself will never be made into gunpowder, if not also 1 lb. of charcoal and 6 lb. of saltpetre are added. Likewise, with only ½ lb. of sulphur, one could never produce 8 lb. of gunpowder, even if tons of both charcoal and saltpetre would be available. Just the same happens during the production of a plant crop. With 80 lb. of nitrogen, 100 lb. of potash, and 50 lb. of phosphoric acid, a total crop of 11,500 lb. of oats may be produced; but were, with the same amount of nitrogen, only 50 lb. of potash or only 25 lb. of phosphoric acid available, only half the crop would be produced, however large the amount of the other plant foods.

This "Law of Minimum" does not only refer to the important trio—phosphoric acid, potash, and nitrogen—but just as much to the other conditions of growth: Light, heat, and moisture. Every farmer knows the great importance of moisture, and with an abundance of every plant food, if present in a natural state in the soil or added in the form of manures, a soil without moisture cannot produce a crop.

This great law is the foundation of all manuring laws; and only by the help of practical tests, soils may be examined to find out which of the plant food or foods are present in the least quantity.

Dr. Liechti made numerous experiments with various soils, both in pots holding about 15 lb. of soil, and also on small test plots in the field. All the experiments gave concordant results, and proved that the amounts of certain plant foods, found by analysis of the soils, are by no means a sure criterion of the fertility of such soils, or are of much help to show what manures should be applied to such soils to obtain a maximum yield.

Of course the value of soil analyses is in many cases quite apparent, and for all his manuring experiments Dr. Liechti had the soil analyses carried out. For instance, when soil is examined for the amount of lime it contains, the analysis will show at once that the presence of a sufficient amount of soluble lime salts, as lime carbonate, lime humate, in a soil producing a small crop, the poorness of the crop would not be due to the want of lime. Again, if the analysis would show the absence of such lime salts, the absolute failure of a heavy application of a manure containing only phosphoric acid, potash, and nitrogen, in producing a better crop, would be explained.

Cultivation experiments, as applied for questioning a soil with regard to its wants, are easily carried out, and could be made by any farmer.

The results of a few of Dr. Liechti's experiments will be given, and are shown in graphic manner in the diagrams of Table I, in which the area of the yields is in proportion to the actual weights obtained. The answers to the questions put to the soils are quite apparent by the resulting yields.

The soils for these experiments were obtained from various fields, and were taken in many places to the usual depth of ploughing. The samples obtained were thoroughly mixed and filled into five pots, holding each about 15 lb. of

* Stickstoffdüngung der landwirthschaftlichen Kulturpflanzen, by Dr. Paul Wagner.

Plate XLII.

TABLE I.

1st Experiment.

Clayey, Sandy Soil, containing:

N = ·284 %, Humus = 3·85 %.

P_2O_5 = ·125 %, K_2O = ·085 %, C_aO = ·94 %, Soluble in 10 % HCl.

1. 2. 3. 4. 5.

Yield in Grammes:

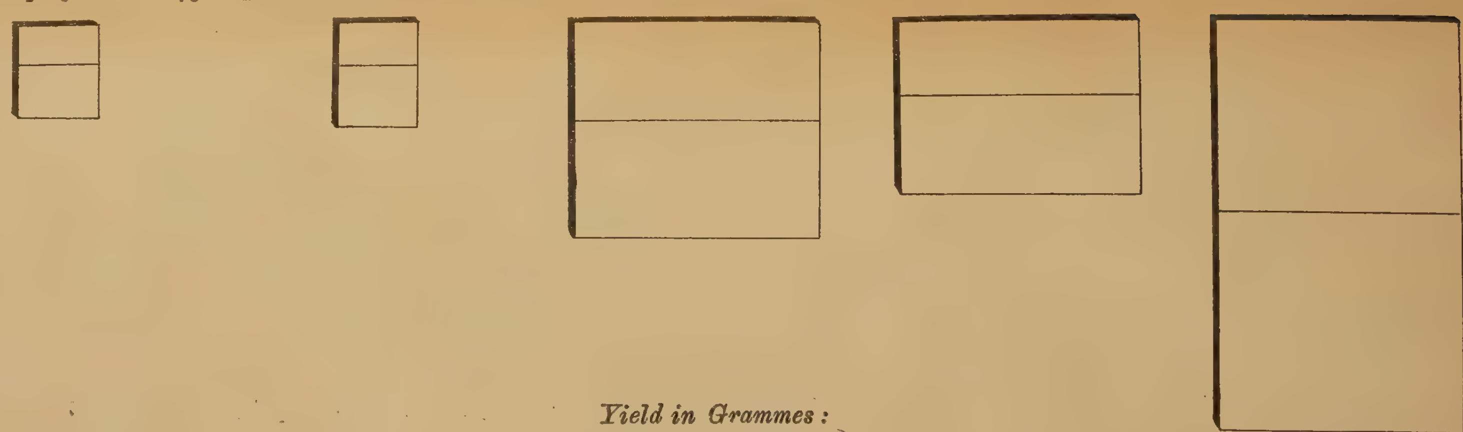
	1.	2.	3.	4.	5.
Grain ...	7·0	5·8	6·8	14·7	102·0
Straw ...	8·1	9·1	13·8	17·6	115·5

2nd Experiment.

Very Sandy, Clayey Soil, containing:

N = ·148 %, Humus = 1·66 %.

P_2O_5 = ·085 %, K_2O = ·081 %, C_aO = ·29 %, Soluble in 10 % HCl.



Yield in Grammes:

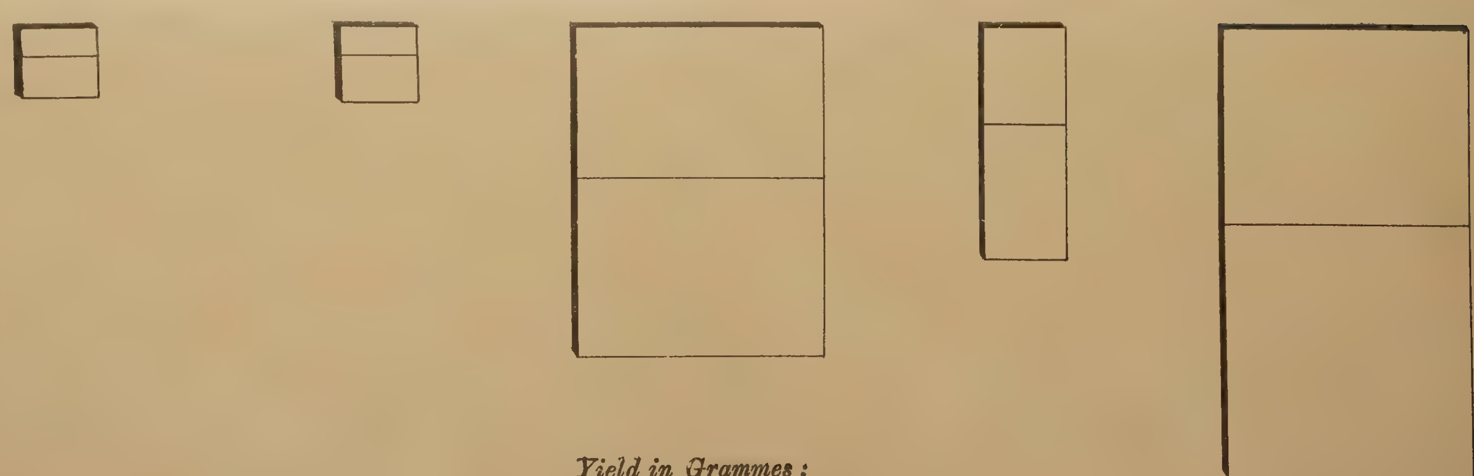
	1.	2.	3.	4.	5.
Grain ...	7·6	8·2	61·9	43·9	115·0
Straw ...	11·3	13·2	70·4	62·3	134·0

3rd Experiment.

Sandy, Clayey, Humus Soil, containing:

N = ·344 %, Humus = 4·8 %.

P_2O_5 = ·166 %, K_2O = ·229 %, C_aO = ·717 %, Soluble in 10 % HCl.



Yield in Grammes:

	1.	2.	3.	4.	5.
Grain ...	5·9	6·0	91·4	19·6	121·2
Straw ...	8·1	9·8	107·7	27·4	151·6

All Experiments were Treated:

1.	2.	3.	4.	5.
Unmanured.	Phosphor. Acid, Potash.	Phosphor. Acid, Nitrogen.	Nitrogen, Potash.	Phosphor. Acid, Potash, Nitrogen.

soil, and sown with oats. Each soil had five pots, which received all a different treatment, each containing one manuring factor less than the other:—

No. 1 pot being unmanured.

No. 2 pot manured with phosphoric acid and potash.

No. 3 pot manured with phosphoric acid and nitrogen.

No. 4 pot manured with potash and nitrogen.

No. 5 pot manured with phosphoric acid, potash, and nitrogen.

The manures were added in sufficient quantities to produce maximum crops; part of the potash and nitrogen were added during the growth of the crop.

The author gives the photographic views of the pots before being harvested. As these views are not so easily reproduced, I will represent to the reader the results in table, giving the yield of both straw and grain by the various areas of the diagrams.

The first experiment shows the soil to be very poor in nitrogen, potash, and phosphoric acid, as the pots 2, 3, and 4, where one or another of these ingredients is wanting, gave poor crops. A soil of this description would require a complete manure, containing nitrogen, phosphoric acid, and potash to give a maximum crop.

The second experiment show a soil of a quite different nature, which, according to agricultural analysis, contains much less of nitrogen and phosphoric acid, but about the same of potash as the soil used in the first experiment. Here, again, pot No. 2 gave a very poor crop, showing great want of nitrogen in the soil. No. 3 pot, however, gave a fair crop, giving 113·4 grammes grain (4 oz.) more than the unmanured pot, which would not have been possible if the soil did not contain a surplus of soluble potash salts; the quantity, however, is not quite large enough to give a maximum crop. It also shows that, although the soil of the second experiment shows by analysis to contain the same amount of potash, it is, as a matter of fact, much richer in available potash salts.

No. 4 pot shows also that the phosphoric acid present in soil No. 2 is in a better form than the higher amount of phosphoric acid of No. 1 soil.

The soil used for the second experiment requires, in the first line, nitrogen, and, in a lesser degree, phosphoric acid and potash to produce heavier crops.

In the third experiment, a soil, according to analysis, fairly rich in nitrogen, humus, phosphoric acid, potash, and lime, still shows a great poverty in nitrogen by the poorness of the crop in the second pot.

Pot 3 teaches us that potash is present in the soil in a fairly large amount in soluble form, whereas the result of pot 4 shows that phosphoric acid is wanting in the soil. The soil requires, consequently, principally nitrogen, and a smaller quantity of phosphoric acid and a trifling amount of potash to get the heaviest possible crop. The experiments show, as already indicated, that the amounts of potash and phosphoric acid given by the agricultural analyses (soluble in 10 per cent. hydrochlorin acid by digesting for three hours on the water bath) are not an absolute guide to tell which manure is chiefly required. A practical pot or plot experiment with a nitrogen or phosphoric acid manure to test for the want of potash, and with a potash-nitrogen manure to test for the want of phosphoric acid, and comparing the results obtained with the yield of a complete manure, will tell the farmer positively if either potash or phosphoric acid, or both, are required by the soil, and in what quantities.

Not only potash, nitrogen, phosphoric acid, with the help of heat, light, and moisture, are required by the plant during the process of growth, but other chemical elements are just as necessary, which, however, are generally found in sufficient quantities. There is one soil constituent which very frequently is present in too small a soluble quantity, which is lime. Lime must be present to produce good crops.

To show this want of lime in soils, Dr. Liechti gives another experiment, which was carried out on a larger scale on blocks of 1 ar. (about $\frac{1}{40}$ acre) each in the field.

Six experiments as—

(1) Unmanured
(2) Phosphoric acid, potash
(3) ,, nitrogen
(4) Potash and nitrogen
(5) Phosphoric acid, potash, nitrogen
(6) ,, ,, ,, and lime—

were carried out in eighteen plots, arranged as follows :—

1	2	3	4	5	6	1	2	3
4	5	6	1	2	3	4	5	6

The soil of the field was a sandy, clayey soil, containing—
Nitrogen, = ·12 %; humus, = 1·75 %; lime carbonate, = ·08 %.
Phosphoric acid, = ·17 %; potash, = ·087 %; lime, = ·3 % } Soluble in hydrochloric acid.
Magnesia, = ·5 %; sulphuric acid, = ·03 % }

Manures were applied at the rate of—

71·3 lb. of phosphoric acid (as superphosphate) per acre.
62·5 lb. of potash (as potassium chloride) per acre.
53·5 lb. of nitrogen (as saltpetre) per acre.
2,000 lb. of lime (as lime carbonate) per acre.

The superphosphate, potash, and lime were applied in the drills; saltpetre was applied in the form of two top dressings during the growth.

The plots were sown with summer wheat. During the progress of growth, the difference on the various plots was very noticeable, and the result of the harvest (four months after sowing) very interesting and instructive.

A complete manure yielded more than double the unmanured plot, and the addition of lime to the complete manure still further increased the yield. The difference in the yield between limed and unlimed plots would have been greater in crops like cloves, &c.

The land requires in about an equal degree nitrogen, potash, and phosphoric acid, and also lime, which was to be expected from the analysis, which only shows ·08 per cent. of lime carbonate. The result of the experiment is given on Table II., and the yield of straw and grain in lb. per acre is again represented by the size of the diagrams.

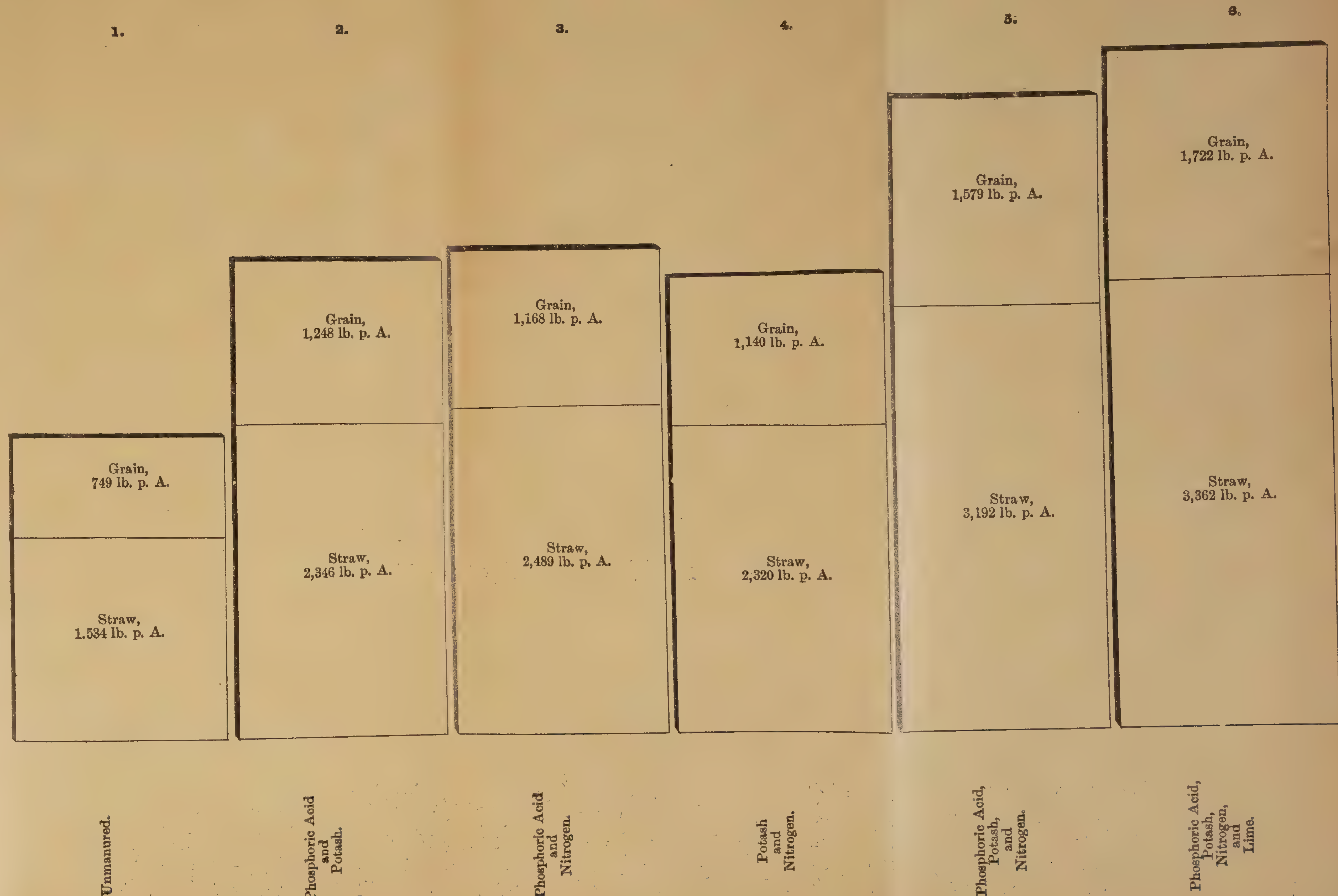
Nobody, after examining the results of these experiments carefully, can deny the great practical value of such experiments. As the experiments are so simple and the result a direct answer to the questions put to the ground, similar tests should be made on every farm on which the crops have shown a falling off.

Before concluding, I cannot omit drawing attention to a paper read by Mr. A. N. Pearson, the Victorian Chemist for Agriculture, before the last meeting of the Australasian Association for the Advancement of Science, on "The Scientific Directing of a Country's Agriculture," in which the author enlarges on the great importance of similarly conducted manuring experiments.

Plate XLIII.

TABLE II.

PLOT EXPERIMENTS:



He shows that the average production for eleven years in Victoria was: 8·52 bushels of wheat, 20·01 bushels of oats, 3·26 tons potatoes per acre, whereas the yield in Great Britain during the same period was 29·49 bushels of wheat, 38·13 bushels oats, 5·15 tons potatoes per acre. He also gives the results of manuring experiments, and shows how easily the yield is increased by proper manuring from $2\frac{1}{3}$ and 12 bushels per acre to $19\frac{1}{3}$ and 33 bushels per acre in the years 1896 and 1898, and proves that a great financial profit is derived by manuring; of particular interest, however, are some experiments in Mr. Benson's paper, which were made in dry districts of Victoria, and in which favourable results were obtained by considerably reducing the quantities of manures applied.

Even as light a dressing as 10 lb. of a concentrated superphosphate per acre gave an increase of 3·8 bushels of wheat, 20 lb. of superphosphate an increase of 6·0 bushels, and 30 lb. of 6·29 bushels per acre.

In another still drier district the result was even more striking, the increase for dressings of 10, 20, and 30 lb. of superphosphate being 4·06, 9·76, and 11·09 bushels of wheat respectively.

These figures further show how important such careful testing of our soils in various parts of the colony is, and such practical plot experiments will not only save money by preventing the application of useless manures, but the quantity of manures required will be brought down to a minimum, and still the crops will be increased.

REPORT ON WORK, QUEENSLAND AGRICULTURAL COLLEGE.

AUGUST, 1900.

The rainfall during the month amounted to 1·325 inches, distributed as follows:—August 1, ·03; 10, ·05; 12, ·29; 14, ·90; 22, ·035; 30, ·02. The weather has been favourable for cultivation, and teams have been kept busy preparing land for potatoes (13 acres), Cape barley ($\frac{1}{2}$ acre), the latter sown near the stud wheats. Lucerne hay has also been mown and gathered in. A portion of the old potato crop was dug out with the potato-digger, the yield being about $2\frac{1}{2}$ tons per acre, and, as anticipated in the last issue of the *Journal*, the potatoes proved to be of excellent quality. The excessive amount of work on the farm prevented the removal of this crop at an earlier date; in consequence of this delay there was a great overgrowth of weeds, causing extra labour in removing the crop. Some virtue may, however, be claimed for these undesirable weeds, for they protected the potatoes near the surface from being affected by the sun. Potatoes were also planted on the 13 acres mentioned above, the total cost of labour for preparation and planting (including students') being £14 8s. During the earlier portion of the month, a good deal of time was spent in preparing for the College exhibit at Bowen Park. A description of this will be found in the September issue of the *Journal*. The exhibits were a decided improvement on those of the previous year.

The crops are all growing strongly, the stud wheats looking particularly well; the Belatourka is especially healthy and vigorous; the malting barley promises a good yield. The peas and vetches, sown at the beginning of the month, were soon above ground, and are doing well. The root crops are all looking well, and have been much admired by visitors.

In the mechanical department, crates were made for sending away the various exhibits, such as pigs, vegetables, farm produce, &c. The hayshed was on the point of completion at the close of the month, and ready for use. A wall has been erected at the dairy to partition off the dynamo which generates the electricity for lighting purposes. The usual blacksmithing work, shoeing

horses and mending machinery, was carried out. A large exhibit of students' work was prepared for the Exhibition. This included all kinds of ironwork, such as horseshoes, ringbolts, gate latches, hinges, two sets of double swings, &c. A collection of architectural and other drawings was also exhibited. A picket fence, enclosing the Principal's residence, was commenced. Additions to the herdsman's cottage are in course of construction.

Forty-six head of cattle were milked during the month. These were fed on green fodder exclusively (barley and lucerne). Some fourteen head of purebreds were housed for the greater part of the month, eight being rugged nightly until the weather became warmer; the rugs were then discarded. When a change to cold weather ensued, the experiment of exposing the cattle for five nights showed an unmistakable shrinkage in the supply of milk, the daily yield amounting to 4 gallons less than previously. As the weather continued frosty, housing was again resorted to, and after two days the normal supply of milk was again reached.

During the month 1,201 gallons of milk were converted into butter, producing 461 lb.; 256 gallons of milk produced 258 lb. of cheese. The increase for the month comprised:—Jerseys, 1 male and 1 female; Ayrshires, 1 male; Shorthorns, 2 females; grades, 1 male and 2 females. The cattle are all in splendid condition. Twelve head of young bulls were disposed of at the Exhibition sales, the following breeds being represented:—Ayrshires (5), Jerseys (4), Shorthorn (1), Devon (1), Holstein-Devon (1).

Pigs.—Increase: Berkshires, 2 boars, 1 sow. Purchased: 1 boar, 4 sows. Sales: Grades, 7 baconers; Berkshires, 11 boars, 23 sows; Tamworths, 1 boar, 2 sows; Yorks, Middle, 2 boars, 2 sows.

The following particulars of the sale of butter and cheese, shipped to South Africa in November last by Messrs. Brown and Howard, on account of the College, came to hand during the month:—Account sales of 10 cases of butter and 7 cases of cheese, shipped to South Africa by Messrs. Brown and Howard, ex s.s. "Damascus," 18th November, 1899:

	£	s.	d.	£	s.	d.
10 boxes of butter = 5 cwt.—						
56 lb. at 1s. 2d. per lb....	3	5	4			
504 lb. at 11d. per lb.	23	2	0			
				26	7	4
Less proportion of charges—						
South Africa	7	1	6			
Queensland	2	15	2			
				9	16	8
Net return, 560 lb. at 7·085d. per lb.				£16	10	8
7 cases cheese = 493 lb.—						
70 lb. at 1s.	3	10	0			
423 lb. at 9½d.	16	14	11			
	20	4	11			
Less rebate, Marquard and Co., 115 lb. at 6d.	2	17	6			
				17	7	5
Less proportion of charges—						
South Africa	4	19	1			
Queensland	1	18	7			
				6	17	8
Net returns, 493 lb. cheese at 5·105d.				£10	9	9

The orchard has been increased to the extent of 2½ acres, the leading varieties of apples, pears, European plums, currants, gooseberries, and American brambles having been planted in this space. The stocks for instruction purposes, referred to on page 237, *Queensland Agricultural Journal*, August number, have been planted. The pruning of all the fruit trees was completed, the students in many cases doing good work. In addition, the vines were dressed with various solutions. The newly imported varieties of strawberries are looking well. The vegetable garden was well stocked, and ground has been prepared for marrows, melons, &c. On the grounds, near the main building, 4½ acres were planted with the leading kinds of apples, peaches, plums, apricots, cherries, and quinces. In the avenues, plane-trees and camphor laurels were planted out. Around the buildings the flower beds received attention, and the shrubs were trimmed; from the growth already made, it is anticipated that during the summer the newly planted trees will make good growth.

The season up to the present time has been good, and, judging from the present condition of the crops, high yields may be anticipated. The whole of the College farm, with the exception of the considerable amount of vegetation in the potato crop above referred to, is looking remarkably well.

The number of visitors who dined at the College during the month was ninety-five. Among them may be included—Lord and Lady Lamington; Governor Le Hunte, of New Guinea; Mr. and Mrs. Pascoe Stuart; and the Minister for Agriculture.

ASPARAGUS CULTIVATION.

By W. SOUTTER.

Asparagus is a plant which, from a vegetable point of view, has few compeers. It is at once dainty, delicate, and delicious, and should have a place in every garden. The cultural conditions necessary to grow asparagus are of the simplest. The whole secret of success in asparagus cultivation lies in the preparation of the beds, with the addition of plenty of manure. Every farmer may have asparagus on his farm provided he carries out the following instructions:—Trench the bed to a depth of 2 or more feet; if the subsoil be of a dense stiff nature, break it well up with the pick and incorporate with it yard manure, grain cavings, half-rotten straw, bones, &c.; replace the top soil, mixing with it old manure (horse or cow); add bonedust, if procurable; the addition of a little coarse salt is advantageous, except when near the coast. Plant out in rows 2 to 3 feet apart, and plants from 12 inches to 18 inches in the row. After planting, mulch the rows with stable or yard manure to a depth of 6 to 9 inches. A liberal watering during the dry season will benefit the plants, but if well mulched this should not be necessary. The best time to plant asparagus is during the months of June and July. The growing season commences in October, and extends right into March or April. About the last week in October the young shoots will begin to force their way through the soil. As soon as they are 2 or 3 inches above ground they should be cut for use, taking care to always cut well down under the surface of the ground. The process of cutting must be done regularly during the season of six to eight weeks, and never allow during that time any shoots to develop. When the season is over allow the plants to make their natural growth, taking care not to permit any seed to ripen and drop. When the tops begin to turn yellow in the autumn, cut level with the ground, and again mulch with manure, salt, or kainit, forking the surface prior to applying it. A bed of asparagus, attended to as shown, will last for seven years, and produce during the spring and early summer a tasty vegetable; two rows 30 feet long will suffice for an ordinary family.

Dairying.

EIGHT REASONS WHY SOME DAIRY FARMERS DO NOT SUCCEED.

1. The cows do not get all they want to eat.

2. The cows are not fed a proper ration—that is, the right kind of food.

3. Neither winter shelter nor summer shade are provided for the cows.

4. The poor cows are not weeded out of the herd. All mature cows that will not produce 200 lb. butter fat in a year should be disposed of.

5. The percentage of poor cows is too large because good dairy bulls are not used.

6. The cows are not milked for more than six months out of the twelve.

7. The dairyman provides neither green food for summer nor hay or ensilage for winter.

8. Too much of the butter is made during the hot months when butter is low. It should be made during the cold months when butter brings a better price.—*Australian Farm and Home.*

FACTORY CHEESE-MAKING.

HOW THE CANADIAN GOES ABOUT IT.

In the course of an interesting practical dissertation on cheese-making at the Western Dairymen's Convention lately, Mr. Nimmo. of Ontario, expressed his views on factory cheese-making thus:—"Now, for the first operation in the morning. Have a good head of steam in the boiler, have everything ready to receive the milk, a good strainer of double cheese cloth stretched on a rack across the vat to catch any flies, hair, leaves, &c., that happens to be in the cans of milk. The manager should take his place on the weighing stand, examine the milk in each can as it is emptied into the weighing can, and reject any milk which proves to be objectionable. Weigh carefully and record each patron's milk, the weight and condition, in a book kept for such purpose. While the milk is being delivered, raise the temperature gradually, being careful not to allow the milk to get scorched; the use of water under the pan is preferred; stir the milk in the vat slowly and continuously until the required amount is run in, and the required temperature is arrived at, say 86 degrees Fahr. for normal milk, but for milk that is over-ripe a lower temperature is preferable. When the weight of milk in the vat is known, and if the cheeses are to be coloured, measure sufficient cheese colour, say $1\frac{1}{4}$ oz. to $1\frac{1}{2}$ oz. to 1,000 lb. of milk, pour into a dipper nearly full of milk, turn the dipper quickly upside down to the bottom of the vat, draw along in this position to the other end, stir vigorously until the colour is thoroughly mixed. This is the best method of mixing the colour through the milk. At this stage it would be well to find the ripeness of the milk. An expert of experience can tell by a certain ripe flavour on normal milk, but the usual method is by the rennet test.

RENNETING.

Take 8 oz. of milk from the vat, add and stir in 1 dr. of rennet, count the number of seconds from the time the rennet is added until the milk is coagulated; if the coagulation takes place in a given number of seconds, which shows that the ripeness has reached the point, that gives the time of curd in the whey, say three hours from the time the rennet is added until the whey is drawn off or dipped. In adding the rennet, measure sufficient and dilute with

water, say 1 pint to 1,000 lb. of milk ; add and stir evenly, and be careful to leave the mass perfectly calm before coagulation begins ; also, allow no draughts to blow across the vat while the milk is coagulating ; in fact, it would be well to use covers. Use sufficient rennet to show signs of coagulation in ten or twelve minutes, fit to cut in two and a-half times of coagulation, say twenty-five or thirty minutes. If the milk is over-ripe, use a larger quantity of rennet. This will make the curd firmer for speedy cutting and stirring, also allow more time to speed the operation. It also tends to help to expel the moisture at the proper stage.

CUTTING THE CURD.

Commence to cut before the curd gets too solid. Have your knife blades sharp and dip in hot water before using. Use horizontal knife first, cutting lengthwise, holding the knife perfectly level ; move slowly, so as not to cause a wave in front of knife. Then immediately take the perpendicular knife, cut crosswise, then lengthwise. Have the blades on knives ⅜-inch apart, and do not lap while cutting. Cut the curd evenly.

First, free any particles of curd from the sides and bottom of the vat, commence to stir gently with the hands for about ten minutes. If the stirring is done rapidly at this stage it will destroy the silkiness of the curd, which is very essential, also a loss arises in butter fat and smashes the curd, so that small particles escape when the whey is drawn. Turn on the steam slowly at first. If no patent agitator or stirrers are used, continue to stir with the hands until the cubes are healed over and get quite firm, which will now be quite ready for the rake, stirring in a rotary motion. Keep the particles of curd well separated. Scald until the required temperature is reached, say 98 degrees for ordinary milk, or if the milk is rich in butter fat, or if the curd is working fast, scald to 100 degrees.

When the required temperature is arrived at, draw off about half of the whey. Now stir vigorously for fifteen or twenty minutes, as this firms up the curd, cooks it evenly, and aids in the expulsion of the whey out of the curd. At this stage it would be well to see if any acid is perceptible. Take a small handful of curd, squeeze dry, apply to a hot iron, and when it strains ⅛-inch to ¼-inch the whey should be drawn immediately. Dip out into a sink and stir until fairly dry. If the acid is developing very fast, or the curd is somewhat moist, it ought to be stirred a little drier than usual. If gas is perceptible, or the curd a little sweet, do not stir so much, and leave in a little moisture, so as to bring about the proper development of acid. Spread evenly over the sink, then let it lay to mat for about fifteen minutes. Take a thin, dull-pointed knife, run through the curd two or three times, lengthwise, then cut crosswise in pieces about 6 to 8 inches wide. Turn upside down, then turn on edge, leaving the pieces a little apart, allowing the whey to get away freely. Now turn and pile up two deep, repeating this operation until they are six or eight deep, the turning to be done every ten or fifteen minutes until the curd is flaky to stringy, which will be about one and a-half to two hours after dipping, when it will be ready for grinding. If the weather is very hot, or the curd working fast, do not pile it. In cool weather it would be well to keep the curd covered, to hold the heat ; also pour a few pails of hot water under the racks.

CUT THE CURD EVENLY.

Use a mill that will cut the curd evenly and not tear in uneven pieces. Stir well after milling, so as to check acid, and give plenty of air, but do not allow any cold draughts to blow across the curd. If the curd is somewhat sloppy or soft, stir well until it appears dry and firm. When the curd cuts smooth and close, and has a smooth, velvety feel, a cheesy flavour, and shows clear butter-fat when squeezed between the fingers, it is time to apply the salt. Use the best cheese salt. Weigh at the rate of 2 lb. to 1,000 lb. in the spring, or for a fast-curing cheese 2½ lb. for summer, 3 lb. to 3½ lb. for fall (or if the

curd shows excessive moisture), and additional salt. Shake the salt on evenly, about three times; draw the curd up into a pile, as this gives it a better chance to take salt evenly and mellow down. Stir out and leave no matted pieces, have the temperature 80 degrees to 85 degrees. To make even cheese, weigh the curd into the hoops. Have the press cloths in hot water for using. When the curd is all in hoops, add the pressure slowly and at short intervals for three-quarters or one hour before turning. Pull out the cheese, pull up the bandage, leaving no wrinkles, seam straight. Use half-a-dipper full of hot water on each end of cheese after the cap cloths are put on. This causes the cloth to stick, and leaves a tougher rind on the cheese. Use large press cloths or aprons on the cheese, which protects from getting rust or marks on, also leaves the cheese easier to get out of the hoop.

Take out cheese next morning, examine carefully to see if there are any wrinkles or faulty places, adjust and wet with hot water, put the cheese on the opposite end of the hoop, put into press until it is needed for another day's cheese. Take out the cheese, strip off the aprons, put them on higher shelves, stencil the date and number of vat, turn every day for about three weeks. Have the room at a temperature of 70 degrees, until the curing begins.

They ought to be removed to a cooler room after two or three weeks at a temperature of 65 degrees, and, as they advance, to be kept an even temperature.

When the cheeses are ready for shipping, remove the canvas cloths, oil with clean butter any cracks that may be seen. Weigh carefully, giving ½-lb. upbeam, thus to avoid any docking after they leave the factory. Put up in neat strong boxes, with wide bands and good-fitting lids. Have the cheese fit snugly in the box; shave the box down level with the top of the cheese. Stencil the weight on the centre of the box near the lap. Write the weights neatly and correctly on duplicate shipping books, placing the figures uniformly, and add correctly. This leaves the cheese ready for the salesman and shipper. Insist on the teamsters handling the boxes carefully, and have wagon boxes swept out clean, and covers to protect the cheese from the sun and rain.

The manager of every cheese factory should keep a daily record of the working of the curd in each vat, to be kept for future reference, which would be beneficial to himself and his assistants, to compare notes of each day's make with the cheese before it is shipped.

PIGS IN AUSTRALIA.

The *Farmer and Stockbreeder* discourses thus on the distribution of pigs in the various colonies:—

The number of pigs in Australasia two years ago, according to the Sydney Government Statistician, did not come up to 1,000,000. Of these Victoria has a larger number than any of the other colonies, its total being equal to 34·9 per cent. of the whole herds; New South Wales ranks second with 21·5 per cent., with New Zealand third with 19·2 per cent., and it, in turn, is followed by Queensland with 11·4 per cent. The balance, 13 per cent., is distributed among the colonies of Tasmania, Western and South Australia. Though New South Wales stands second at present, the Sydney market may be said to control the Australian markets, as most of the southern colonies buy largely there, both in a live and cured form. But in New South Wales and the other colonies the breeding of pigs, in conjunction with dairy-farming, has been much neglected, and the increase in the number of swine has not kept pace with the increase in the quantity of milk available for food. This may be due to the fact that the pig in Australia is regarded as a grazing animal.

Throughout the colonies the people are now daily learning to consume more pork products, and there are areas which, through climatic conditions, are not pork-producing, which will have to be supplied from other areas in the

colonies more favourably placed. From present appearances it seems that it will be many years yet before the local demand can be supplied if consumption increases at the same ratio as in the past. The most promising feature for the Australian pig breeding and feeding industry, however, is the attention now being paid to opening up markets in London and elsewhere, so as to obtain an outlet for the surplus production of pork, bacon, and hams, and thus avoid glutted local markets. When production was confined to supplying local markets, the breeding and improvement of swine were retarded by the periodical occurrence of over-production and consequent low prices. With an outside export market, it is expected the industry will be as profitable in Australia as it is in such countries as America and Denmark, and that it will show a rate of expansion akin to that of the Australian butter trade.

THE BREEDS

generally met with in the Australian colonies are the Berkshires, Poland-Chinas, Yorkshires, and Tamworths. The Berkshire is, undoubtedly, the favourite breed in Australia, and the demand for it is greater than for all other breeds put together. Brisbane bacon-curers and Queensland pig-breeders favour the improved Berkshire. In South Australia and some parts of Victoria the Berkshire and Essex cross is a favourite. In some cases, also, the Berkshires are being crossed in Victoria with Yorkshires and Hampshires, the latter having but recently been introduced, in order to produce a type fulfilling the requirements of the modern market. In the northern coast district of New South Wales the Berkshire and Yorkshire cross is largely favoured; but over the greater portion of the colonies the pure Berkshire is mostly bred. If farmers do not keep pure-bred pigs of this breed, they are accepted as very nearly pure. It is often considered allowable, we may note, for the sow to have a strain of some other breed, but not the boar. The Berkshire is regarded by the farmers as on the whole the best pig to keep either for market or for home use, and they have shown themselves to be well suited to the Australian climate. They are hardy, rarely suffer from sunscald, and are good grazers. Any breed of pigs to meet the Australian requirements must have the three points just noted.

As regards Yorkshires, there are not many specimens of the "Large White" in the colonies, as the "Middle" breed seems generally to be preferred, but none of the White breeds are in great favour because they scald badly, and are therefore not a good sort to use for grazing. When a sty pig is required, the Middle Yorkshire is a favourite breed with many, but a cross with the Berkshire is generally preferred. The Small Yorkshire, again, is too small to become popular, being regarded as essentially a breed for porkers. Sydney butchers, however, prefer it for pork to any other breed, and therefore it always brings a high price.

The Poland-China breed were once in great favour with Australian breeders, but of late years the breed has been neglected. In Australia at the present day they seem to have become either too inbred or have been crossed with other breeds and spoiled. They are, however, as a breed, regarded as very hardy and excellent grazers. In the United States this breed is the great rival of the Berkshire, and American breeders consider that they will make more pounds of pork per bushel of maize than any other pig. The modern type of Poland-Chinas that are to be found in the colonies have been imported lately from America. The old type of Poland-Chinas had a good bit of white about them, but the modern type are nearly all black, only showing small patches of white on the face and feet.

TAMWORTHS AND BLACK BREEDS.

The Tamworth is a comparatively new breed to many in the colonies, but they are rapidly coming to the front. They are regarded as fundamentally a dairy breed of swine, and it is said that a successful dairyman should, from his association with high-bred dairy cows, make a good breeder of Tamworths. According to American authorities, the Tamworth is the pig *par excellence* for the feeder and curer, and it must be borne in mind that the Australian farmer

and breeder will follow much more readily the advice tendered by an American authority than he will that tendered by an English authority. Though a bright red colour is fashionable for Tamworths, the colour most esteemed in Australia is dark red, in fact, almost black, for in Australia black in the pig is the colour associated with hardiness, and non-liability to sun-scalds. Another advantage claimed for the Tamworths, which appeals strongly to the Australian breeder and farmer, is that they are better able to get their own living than any other breed, as they are good travellers, and are provided with a snout suitable for digging up roots. It is further claimed that when fat they are the only breed able to walk to market. Many in the colonies, we may add, now think that the infusion of Tamworth blood into that of Berkshires would be a decided improvement.

As the black breeds of southern England seem to be most favoured in Australia, it has been suggested that the Sussex, Suffolks, and other varieties of the same black type might be advantageously introduced. Specimens, however, can be found in the colonies as it is, but it is doubtful if they will ever become general. The Essex breed, we may add, is one that used to be favoured in Australia, but are now discarded, as they are found to have very little lean mixed with the bacon, and the middles are very uneven.

The pig in Australia, it should be borne in mind, is not fed for points, nor will it be pampered and fed for weight. What is wanted is a pig that is hardy, will not sun-scald, does not need expensive housing, is a good grazer, and not a hard feeder, and is able to turn its food into good meat. The scrub pig has a razor back, and is like a greyhound in its build. An animal with a very short compact body, a frame broad in proportion to its length, and that stands on small short legs, is looked upon in Australia as simply a lard pig. What is wanted is a pig that will give lean medium-sized bacon, in which streaky meat will predominate.

FEEDING, &c.

In America, a prime baconer means a pig not less than 180 lb. to 200 lb., but in Australia they run from 120 lb. to 150 lb., though buyers, as a rule, prefer them about 150 lb. to 160 lb. Porkers are usually sold when from 60 lb. to 90 lb. in weight. For some time past there has been a good demand for pigs of all kinds, and prices have been remunerative. At present, owing to the winter feed for pigs not being generally grown, when milk is scarce the demand for store pigs at the commencement of summer is very great, while there is a glut of fat pigs at low prices as winter approaches. This rush usually takes place in May, June, and July, in consequence of the maize and pumpkin crops being harvested. An Australian farmer who sells his milk to a creamery can purchase separated milk at from 2d. to 3d. for 10 gallons, at which price it makes a good pig feed, provided it is supplemented with maize, rye, peas, mangels, or pumpkins. Grain-fed pigs are, however, always worth more than milk and slop-fed pigs; and as the American farmer prefers selling his cheap grain products in the form of live pork, there is little doubt the Australian farmer will follow his example when the Australian export trade in pig meat has been established on a fairly satisfactory basis. At present there are few factories devoted entirely to the curing of bacon and ham, and dairying farmers find it difficult to obtain a good class of store pigs. Crosses of the breeds we have mentioned are no doubt numerous in the country, but unfortunately, in the majority of cases, the animals have deteriorated from want of care and selection in the breeding. Official authorities are now advising the Australian farmers to feed with maize and skim milk, also they state that it will repay him to feed his maize, wheat, barley, lucerne, &c., to the pigs, instead of marketing it in the form of grain. The authorities in question also advise the growth of pasture grasses or forage crops, for they consider that the pig, by nature, is a grazing animal, and therefore to produce pork at the lowest price pastures are absolutely necessary. It is admitted, we may add, that you can feed a properly-balanced ration in the stye, but it is stated that pigs so fed will not develop as well as pigs fed on pasture.

The Berkshires at present, as a breed, hold the ground in Australia, but in time they may have to divide the honours with the Tamworths. What English breeders have to considerare—first, that Australia wants to get a share of Great Britain's imports of bacon and hams, and wants pigs that will meet the wants of the market here; and secondly, that the breed to be generally acceptable must be hardy, not be subject to scalds, graze well, and be easily finished off without requiring much housing.

PIGS FOR PROFIT.

BREEDS OF PIGS—A BREEDER'S VIEWS.

It is a true saying that pigs are either copper or gold. It only stands to reason that the pigs for profit are the "gold" ones, but as this, unfortunately, cannot always be arranged, it is to the "pork producer" to make the most of his opportunities when pigs are in their "copper" state. To do this, he must make the highest possible price of his pork all the year round.

At the present time, if a fair price is to be realised for pork, it must be of the best quality possible to produce, and this is only obtained by paying careful attention to two things—viz., the breeding of the animals that produce it, and the feeding of those animals.

It is my intention to deal with the feeding later on, and for the present give a short description of those breeds which are most suitable for bacon and pork producing.

A great many neglect this absolutely essential point in the production of good bacon, and keep pigs (?) that have been crossed anyhow for generations, with the result that they now have pigs in their styes not so hardy, not so prolific, and that take twice as much food to make a stone of good (?) pork as pigs which have been carefully bred and crossed.

THE LARGE WHITE OR IMPROVED YORKSHIRE,

as it is sometimes called, is one of the principal breeds in England in the present day. Its representatives, when arrived at maturity, are larger than those of any other breed. Of late years they have been bred to produce much finer and better quality pork than was the case some twenty or thirty years ago.

Apparently the aim of the Large White breeders in years gone by was to produce a pig which, when three or four years old, had reached an enormous weight. But whether this weight consisted of bone, muscle, lean, or fat, or whether it was carried at the head or the tail, appeared to matter little.

Happily this state of things has been, to a great extent, done away with. Breeders of pigs soon found that if meat of a younger and finer quality could be produced the public would be willing to pay a higher price. Consequently they set themselves to work to breed that class of pork-maker that was best suited to the public taste, so that we now have a pig not too heavy in the shoulders, well let down, with well-shaped hams, and deep bacon sides, light in the bone and spare in the offal, with plenty of lean in proportion to the fat; in fact, just the animal that is required by bacon-curers. A feature of this breed, which must not be forgotten when buying young pigs, is that they do not fully develop their points until some months old, a pig at five months often proving at a year or fifteen months a much better animal than could be anticipated at the early age, and *vice versâ*.

The prolificacy of the Large White is worthy of mention. I have had a sow farrow with a litter of nineteen, and have heard on very good authority of a litter of twenty-one. My own experience is that a litter of from ten to twelve good pigs is sufficient; better for the sow, and better for her owner than a large litter.

THE MIDDLE WHITE

is the breed which most nearly resembles the Large White, but, when full grown, it is never as large as the "Improved Yorkshire," and, being shorter, thicker, and more compact, it is inclined to carry more fat in proportion to the lean.

If the pig-breeder intends to keep pigs that will be ready for the butcher at an early age, he cannot do better than keep a good cross of Large and Middle Whites.

THE SMALL WHITE

can scarcely be considered a "pig for profit," unless the local outlet is peculiar; consequently I do not consider it necessary to describe it at any length.

There is one thing, however, which ought not to pass unnoticed in connection with this breed—viz., it is sometimes considered a good plan if the breeders' sows do not appear to breed pigs with sufficient aptitude to fatten at an early age, to mate them with a Small White boar. Of course, where this is done the result would not be suitable for supplying a market where large bacon pigs are required for salting, shipping, &c. But where pigs are required for ordinary public consumption this course can be recommended, producing pigs, not over large, which will be in good market condition at from five to six months old. If it is required to breed pigs rather bigger than those produced in the above way, it is advisable to use a Middle White, but, as I said before, the best boar to produce bacon pigs (provided the sows are suitable) is a Large White.

THE BERKSHIRE.

This breed is one which in the last twenty years has suffered considerably at the hands of those breeders who have earned for themselves the name of "pig-fancier." Apparently they were not content with the splendid type of pork-producer then exhibited under the name of the Berkshire, but took it into their heads to alter it by careful (?) breeding, so that it is now a pig which may still be considered a very fair all-round breed, but not so serviceable as that of years gone by, not so hardy, not so prolific (in fact, this is one of their worst points), and its pork is rather coarser than that of its ancestors. As far as looks are concerned, a Berkshire can sweep the board when in show condition, as it is so compact and square, and short on the leg. Berkshire sows when mated with a Large White boar make an excellent cross.

THE TAMWORTH,

with its golden red hair, a very long and somewhat narrow snout, and in the case of the boars not so sweet-tempered, is the pig which of all other breeds might be considered the "domesticated savage," since it most nearly resembles the original type of the wild pig, although it is rather longer and not so heavy in the shoulder as its forefather.

It is considered, in fact has been proved to be, the next best breed to the Large White for the production of bacon, but it will be left for future experiments to show whether the Large Black will displace it.

THE LARGE BLACK.

This is a breed that has not come much into notice till the last few years, but it has now, I think, been successfully tested by breeders as a producer of good bacon, the results of which are proving very beneficial to the breed. A Large Black society has been formed, and a Large Black herd-book started, so that the number of its breeders is now gradually and surely increasing, with the nearly certain result that its qualities will soon be exhibited in all show yards, and it will receive a place, if it has not already done so, with all the breeds that might be considered pigs for profit.

It is rather like the Tamworth in shape and qualities. Its chief points of difference are—(1) its colour, which, of course, is black; (2) its snout is hardly as long; (3) its ears are more drooping over in front; (4) it is rather narrower

in the back. But, as I said before, it runs the Tamworth "neck or nothing" for bacon-producing.

We now have a fair idea of the qualities, or otherwise, of the chief breeds. It is now left to the intending pig-breeder to decide what breed would suit his requirements best. To do this he must study the local demand; for instance, if the demand is chiefly for bacon pigs he must select one of those breeds that are considered the best bacon-producers, and so on.

I would add (and this is very important) that if he does not wish to keep a pure breed of pigs, let him beware of crossing two cross-bred pigs, as the results are hardly ever as satisfactory as crossing two pure breeds.

Pure-bred pigs cost no more to feed than mongrels, and their progeny produce more pork for every stone of meal consumed.

FEEDING FOR BACON.

A lot of pig-feeding experiments were carried out on a Canadian experimental farm last year, and the results have recently been published. The chief conclusions arrived at are as follow:—There is a gradual increase in the quantity of food consumed for every pound of gain in live weight after the weight exceeds 100 lb.; that the most profitable time to kill bacon pigs is when they weigh from 175 lb. to 200 lb. Skim milk adds most materially to the value of a grain ration, and 100 lb. mixed grains are equal to about 700 lb. skim milk. On an average the dressed weight of well-fed pigs is about 76½ per cent. of the fatted live weight. The type of an animal influences the character of the meat more than the breed, and the fact of a pig being a Yorkshire or Tamworth will not ensure a good bacon carcass if it is not of a satisfactory type, both as regards form and size of carcass, and of a well-doing nature. Firm meat can always be obtained by giving ground barley, peas, and oats, mixed with skim milk, and the greatest gain from such is obtained after being soaked for twenty-four hours. Whole grain often passes through a pig without having been properly digested. A ration composed of the meal of mixed grain is more economical than each kind of meal fed separately. It is probable that running about reduces the apparent bulk of the lean flesh by converting it into muscle, thus consolidating rather than enlarging it. The tendons and sinews are also made larger and are hardened by continuous use; consequently the quality of the pork is not so high as it should be, and the time occupied in bringing the pig to the required weight is far greater than is desirable or profitable. That the kind of food and the form in which it is given has much to do with the quality of the pork there is little reason to doubt; and, therefore, this is a matter that requires full consideration. Now pigs. unlike ruminating animals, do not require their food to be in large bulk; in fact, the smaller the compass in which the requisite amount of nourishment can be can be administered the better the results that are obtained. Therefore it is well from the commencement to separate the selected store pigs from those that are to be converted into pork, varying the quality and consistency of the food in each case. For example, store pigs should lead an outdoor existence, having three or four good meals per day given to them, so that they keep in such condition as will enable the farmer to judge fairly of their suitability for breeding purposes. On the other hand, those set apart for slaughter should be placed in well-ventilated styes, and given a sufficiency of barley-meal made into a thick gruel, the thickness of this gruel being gradually increased as the pig increases in size, until it is of the consistency of soft dough. Erom this point the fattening process proper may be said to begin, and it is then advisable to give a small quantity of water two or three times a day, say an hour or so after the previous meal had been given. If this course is adopted, the food will be well acted upon by the gastric juices, so that the digestion will be perfect, and the full value as a meat producer will be extracted from it. Flatulence, so common and annoying to the animal, will be avoided, and rapid increase of weight and fatness will be the result. When slaughtered, the flesh will be firm, fat and lean being well balanced, and the best financial results will be secured.—*Exchange.*

THE DAIRY HERD.

QUEENSLAND AGRICULTURAL COLLEGE.

Returns from 1st to 31st August, 1900.

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.			
Blink* ...	Ayrshire... ...	21 Mar., 1900	763	3·7	31·61	
Bonnie ...	,, ...	17 April ,,	471	3·8	20·04	
Laverock ...	,, ...	7 Dec., 1899	553	3·5	21·67	
Linnet* ...	,, ...	15 May, 1900	637	3·8	27·11	
Lavina* ...	,, ...	6 April ,,	754	3·6	30·4	
Rosebud* ...	,, ...	10 April ,,	787	3·9	34·37	
Annie Laurie*	,, ...	30 May ,,	886	3·5	34·73	
Isabelle* ...	,, ...	7 July ,,	724	3·5	28·38	
Ream* ...	,, ...	24 July ,,	761	4·0	34·09	
Lena* ...	,, ...	30 July ,,	915	3·7	37·91	
Laura ...	,, ...	28 Aug. ,,	41	4·2	1·98	With first calf
Effie* ...	Jersey	16 Dec., 1899	306	4·5	15·42	
Jersey Belle*	,, ...	21 May, 1900	635	5·5	39·07	
Opale* ...	,, ...	16 Dec., 1899	215	5·2	12·52	
Content* ...	,, ...	18 July, 1900	655	4·9	35·94	
Playful* ...	,, ...	14 July ,,	832	4·0	37·27	
Baroness* ...	,, ...	3 Aug. ,,	605	5·6	37·94	
Carrie ...	,, ...	18 Aug. ,,	197	4·8	10·36	With first calf
Spec ...	,, ...	26 Aug. ,,	52	4·2	2·44	With first calf
Stumpy ...	,, ...	29 Aug. ,,	28	4·0	1·25	
Cherry ...	Shorthorn ...	19 Feb. ,,	272	4·0	12·18	
Gladdy ...	,, ...	2 May ,,	736	3·6	29·67	
Hilda ...	,, ...	25 May ,,	630	3·4	23·99	
Louisa ...	,, ...	6 April ,,	683	3·8	29·06	
May ...	,, ...	20 May ,,	637	3·9	27·82	
Nestor ...	,, ...	21 April ,,	672	3·6	27·09	
Folly ...	,, ...	15 May ,,	336	4·0	15·05	
Plover ...	,, ...	3 July ,,	777	3·6	31·32	
Guinea ...	,, ...	29 April ,,	588	4·2	27·65	
Queenie ...	,, ...	29 April ,,	651	3·4	24·79	
Frizzy ...	,, ,, ...	23 Aug. ,,	165	3·3	6·09	
Alice ...	Grade Shorthorn	13 Nov., 1899	492	3·6	19·83	
Eva ...	,, ,, ...	18 May, 1900	496	3·8	21·109	
Ginger ...	,, ,, ...	17 June, 1899	114	4·4	5·61	Dry, 18-8-00
Gertie ...	,, ,, ...	31 May, 1900	795	3·6	32·05	
Polly ...	,, ,, ...	29 Jan. ,,	641	3·7	26·56	
Rusty ...	,, ,, ...	17 Jan. ,,	518	3·9	22·62	
Sally ...	,, ,, ...	23 Sept., 1899	163	4·1	7·48	Dry, 18-8-00
Trial ...	,, ,, ...	26 Oct. ,,	92	4·5	4·63	Dry, 20-8-00
Stranger ...	,, ,, ...	7 July, 1900	733	3·3	27·08	
Ball ...	,, ,, ...	14 Aug. ,,	165	4·0	7·39	
Duchess ...	,, ,, ...	24 Aug. ,,	92	3·7	3·8	
Pet ...	Grade Jersey ...	14 Aug. ,,	235	3·4	8·94	
Fancy ...	South Coast ...	21 Mar. ,,	727	3·6	29·31	
Damsel ...	Holstein ...	5 Dec., 1899	486	3·2	17·42	
Dairymaid	,, ...	15 May, 1900	842	3·0	28·29	

Cows marked * were, with the exception of some five days, housed during the month. The cows were fed twice daily, at milking time, with green fodder, chiefly barley and lucerne.

THE BACON-CURING INDUSTRY.

EXPERIMENTS BY THE HAWKESBURY AGRICULTURAL COLLEGE.

At the invitation of Mr. C. Barnes, ham and bacon curer, of Liverpool street, Sydney, a large number of gentlemen interested in the wholesale and retail produce trade recently gathered together for the purpose of having a trade examination of bacon which had been cured by Mr. Barnes from different pigs bred by Mr. G. Valder, Principal of the Hawkesbury Agricultural College, in order to determine which breed is most suitable for this colony. The luncheon was held prior to the examination of the bacon. Mr. Barnes presided.

Among those present were the Minister for Agriculture (Mr. J. L. Fegan), Mr. G. Valder, Professor Anderson Stuart, Mr. H. Pateson, and many others directly associated with the farming industry.

After honouring a short toast list, the company adjourned to Mr. Barnes's factory, close by, to examine the bacon in question. Mr. Valder had submitted five different breeds of pigs for curing, the result of which was clean and acceptable. The merit, from a trade point of view, was as follows, in the order given:—

	Weight before being cut up and cured. 20th June. lb.	Weight after Curing. 15th August. lb.	Loss.
2 Berkshire	224	145	35·26
1 Cross Yorkshire-Berkshire	112	92	17.85
2 Tamworth	290	213	26·55
2 Yorkshire	244	178	27·05
1 Yorkshire	104	89	14·42

All the above were under eight months old, and hailed from the stud at the Hawkesbury College. The food consisted of milk, green stuff, and grain.

TO CURE HAMS.

The following is a good recipe for curing hams instead of smoking them. It is taken from an old-fashioned recipe-book by a Dr. Chase :—For 100 lb. of ham, take coarse salt 8 lb., saltpetre 2 oz., brown sugar 2 lb., potash 1½ oz., water 4 gallons. Saleratus, 2 oz., may be substituted for the potash. Pour over the meat. In three to five weeks the meat has a flavour considered by many superior to that cured by smoking.

AGRICULTURAL AND PASTORAL SOCIETY OF SOUTHERN QUEENSLAND.

RESULTS OF MILK TESTS, BEENLEIGH SHOW.

7th SEPTEMBER, 1900.

	Owner.	Name of Cow.	Lb. of Milk.	Per cent. Butter Fat.	Lb. Commercial Butter.
Morning.	Mr. G. F. Dauth ...	Spot...	16¼	3·9	·708
	Mrs. E. Cooper ...	Marguerite... ...	19½	2·8	·611
	Ditto	Violet	24¾	2·5	·692
Evening.	Mr. G. F. Dauth ...	Spot...	10¾	3·8	·456
	Mrs. E. Cooper ...	Marguerite... ...	12	4·9	·658
	Ditto	Violet	19¾	2·7	·596

Total Lb. Commercial Butter.

Violet.	Marguerite.	Spot.
·692	·611	·708
·596	·658	·456
1·288	1·269	1·164

Poultry.

IMPORTANT TO POULTRY RAISERS.

The following directions for protecting sitting hens against lice and mites are given in *The American Gamekeeper*, a publication which is a reliable authority on everything connected with the poultry industry :—

A cheap and easy method of destroying these pests, and so keeping them from the sitting hens, is to place one or two of the camphorated balls (such as those displayed in the windows of drug stores) in each nest. They cost very little, and by putting them in the nest the work is done, a single ball lasting through the entire warm season.

Every time the hen goes on the nest she imparts heat to it, and a portion of the camphor odorises her body and also the material of the nest, lice giving it a wide berth. One of the balls, if placed in a vial of sweet oil, and applied to the heads of the fowls and chicks, on the shanks, or under the wings, will also prove serviceable in preventing scaly legs and destroying the large lice.

For chicks, only use one or two drops of the mixture, as grease of any kind is injurious to chicks.

If preferred, a mixture may be prepared by using 1 part of lard oil, 1 part linseed oil, a few grains of camphor, and 2 or 3 drops of oil of sassafras, shaking the mixture well before using.

Whitewash the sides and top of the hen-house and use plenty of carbolic acid in the wash ; put it on thick over the roosts, nests, and every board, to kill the insect eggs, lice, mites, and germs of contagious diseases if there be any, and to purify and keep things healthy.

Chicks will commence to scratch when they are but a day old, no difference whether they see the old hen scratch or not. If they are hatched in an incubator and reared in a brooder, they will scratch just the same. This proves that scratching comes by intuition, and is Nature's plan whereby fowls may get their living. It is a sensible thing that fowls should be made to scratch for nearly all they eat. Scratching will tend to make them vigorous and prolific.

THE EGG TRADE OF EGYPT.

EXPORT OF EGGS.

The *Reichs-Anzeiger* of the 23rd March publishes a report from the German consul at Cairo on the subject of the egg trade of Egypt. This branch of the export trade has, it would appear, been in existence for about five years, and last season's export amounted to about 30,000 boxes, each containing 1,440 eggs, whilst this season's export is expected to amount to 50,000 boxes. The season lasts from the beginning of December until the end of March. The eggs come printipally from the provinces of Upper Egypt—Kench, Girgeh, Assiat, and Fayoum, the latter of which supplies the best kind of eggs. The eggs of Lower Egypt are much larger than those of Upper Egypt, the latter being very small. The eggs are collected in the villages by native middlemen, who dispose of them to exporters in Cairo in parcels of 100,000 and upwards. The eggs are carefully dried and packed in wooden boxes—1,440 in each box. Owing to the scarcity and consequent dearness of wood in Egypt, the whole of the packing material has to be imported from Europe. When packed, the boxes of eggs are despatched by rail in closed wagons to Alexandria for shipment. About one-half of the exports are sent to Liverpool by cargo steamers, the passage taking about twelve days. Considerable quantities are sent to France, especially at the beginning of the season, and there is also an export trade to Austria.

The eggs are used chiefly for industrial purposes—biscuit-making, &c. Prices in London and Liverpool vary from 43s. to 87s. per box, the average being from 48s. to 50s. The price at which the eggs are bought in Egypt varies according to the market in Europe, and under especially favourable circumstances has reached 150 piastres (say, 30s. 6d.) per 1,000; but at other times they have only fetched half this amount.

Business in Cairo is in the hands of two large firms, one of them being German, and in Alexandria five larger and a number of small firms carry on the trade.

REGULATING THE SEX.

1. To produce a preponderance of cockerels, mate a vigorous cockerel to pullets or yearling hens, and feed them on coarse food, and rather scantily. By no means give them enough to get fat. If they can be made to work for their living, and be kept on the go, so much the better. Still, they should not be starved, or they will not lay, and will cease to be profitable.

2. To produce a preponderance of pullets, mate a vigorous two-year-old cock to hens two or three years old. At the time the mating is made, have them a bit thin in flesh, but not thin enough to impair their vigour. Feed them during the period the eggs are saved for hatching on the most nourishing food, and all that they will eat at each meal, so that they will steadily gain in flesh while they are laying. As the breeding period does not need to be long, the hens will not get too fat before the system of feeding ceases to be profitable, and affects the fertility of the eggs. Avoid all forcing mixtures, but let them lay just what they will without any attempt at forcing the production.

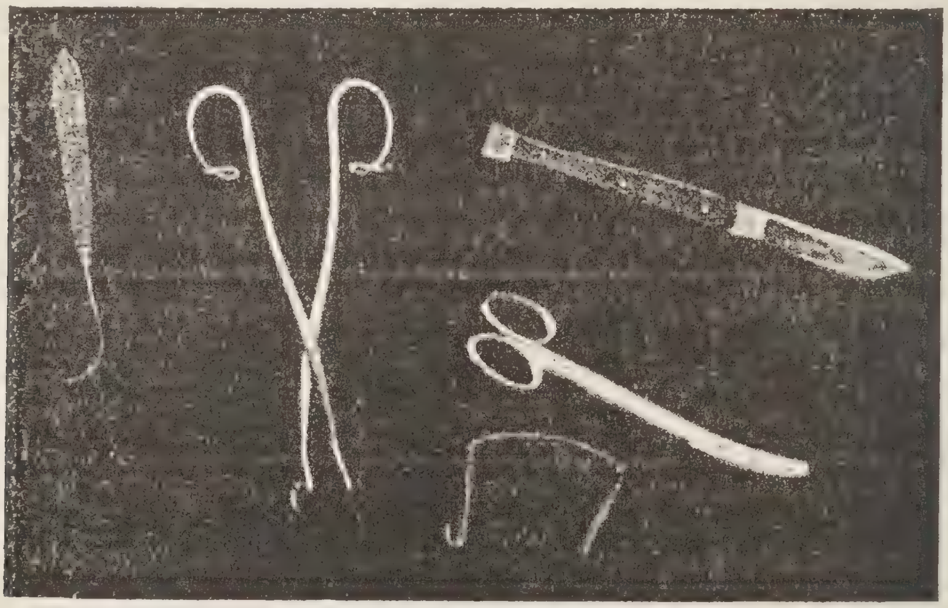
I believe that if these principles are followed some control can be exerted over the preponderance of the sexes. This belief rests not only upon the reasonableness of the theory, and the results which have followed upon experiments made to test it, but upon facts which I have observed in practical breeding operations. For example, last season I had one mating where the male was a cockerel and the females yearling hens and pullets. From that mating I raised sixteen chickens—nine males and seven females. From another mating of a cock to pullets I reared broods in which the pullets somewhat preponderated. If my pullets had been hens, I believe the preponderance would have been greater. In former years I have produced from cockerels mated to pullets a strong preponderance of males, and from cocks mated to hens an equally strong preponderance of females. And while I have noted not a few exceptions to these rules—cases where old fowls produced largely male chickens—yet the results have been on the whole favourable to the matings recommended. But no one should imagine, even if he follows the methods indicated with absolute fidelity, that his successes will be assured, or that no exceptions will arise to vex him and discompose his calculations. He must be content if he secures a moderate degree of success, and the average of the results are favourable to his desires.—H. S. Babcock, in *Country Gentleman.*

ECONOMIC POULTRY FARMING.

THE ART OF CAPONISING.

On Saturday morning, 9th July, at the Department of Agriculture, Mr. H. Nathan, V.S., Inspector of Stock, delivered a lecture on the art of caponising, before a large number of poultry-breeders. Mr. Nathan said that it was not generally known that the capon was the greatest adjunct to economic poultry-farming. The art of caponising enabled the poultry-farmer to carry out his operations on the same methodical principles of all other live-stock industries. The capon had a far greater use than other emasculated domestic animals—namely, that of being trained for the purpose of rearing broods of young chickens. The

art of caponising was well known and practised by the ancients, the capon being deemed as essential to the patrician table as bullock meat and mutton are to ours of the present day. Mr. Nathan mentioned many ancient writers who referred to capons having been used for bringing up broods. The methods of caponising adopted by the ancients were explained, and the lecturer proceeded to give his method of training a capon. He said that the bird should have been operated upon at least two months. It should be placed in a box 3 feet deep by 1½ feet, which should be fitted with a lid for ventilation, but totally excluding the light. This box should rest perpendicularly on level ground, with the lid uppermost, and a flap-door, constructed near the ground line, large enough to introduce the hand with some food in it. Give no food or water for 24 hours, after which period introduce some wheat in your hand through the flap. If the bird eats, two or three fairly large chicks may be introduced and fed with it; but, if a rebellious spirit is exhibited, immediately withdraw the company and institute further solitary confinement. A rebellious spirit seldom lasts more than 36 hours, as birds usually become docile within that period. This operation must be repeated from time to time, for the bird soon notices its companions, and scratches for them; they are welcomed, and the gregarious instinct is established. It now exhibits all the interest of maternal affection, and will exercise its rasorial art, and, if necessary, will die in mortal combat for its adopted



CAPONISING INSTRUMENTS.

brood. The great advantage with the capon is that it will take different-sized chicks in one clutch, will cover twenty, will act as a mother even after a spell of six months, and, the instinct once acquired, he is always ready to do duty. At twenty months' old, if decently bred, the capon is the very acme of perfection for a table bird. By this means the greatest difficulty attendant upon artificial incubation is overcome, and wherever the system has been tried absolute success in poultry-rearing has resulted with a minimum amount of labour. Mr. Nathan then exhibited the instruments which he, as expert for the South Australian Government, at the request of the Minister for Agriculture, Dr. Cockburn, had designed for the operation of caponising, and which he said were not costly. He then gave the following description of the operation:—A board 2 feet square is required. A tape for securing the wings should be nailed a foot from each end, and 4 inches from one side. At right angles to this, near the top end, nail another for securing the head. Opposite to this, at the other end, a similar piece of tape nailed will secure the legs. Thus your bird is fully extended placed on its left side. The instruments required are a protractor or spring, a blunt hook, and a knife with a broad convex blade, and forceps, specially constructed, with a ring closing on

a flat electro-plated disc. Take an aseptic sponge that has been soaked, after having been thoroughly cleansed from dirt, in a solution of corrosive sublimate (1 in 1,000) and thoroughly wash the seat of operation with this dilution. Feel for the last two ribs, and remove any feathers which may be in your way. Divide by one stroke the muscle between these ribs, and place the protractor in the opening. On looking into the wound a blod-clot will generally be seen, on removal of which a shining semi-transparent membrane (the peritoneum) will be exposed to view. Tear this with the blunt hook, and on carefully removing the intestines to one side with the forceps, the glands will be brought into view, situated on either side of the spinal column as glistening white bodies. These should be gently twisted, and removed through the cavity. The protractor should now be removed. All that is necessary after treatment is to keep the bird on soft food for two or three days. Always fast the bird to be operated on for twenty-four hours previously to operation. Mr. Nathan then operated on two fowls by way of explaining, and those present expressed their thanks for the instruction they had received.—*Journal of the Department of Agriculture*, W.A.

IMPORTS OF POULTRY AND EGGS INTO WESTERN AUSTRALIA.

The following return shows the importations of poultry and other birds and eggs into Western Australia:—In 1895, 1,196 crates of a value of £1,786; in 1896, 2,671 crates, of a value of £3,196; in 1897, 1,706 crates, of a value of £3,218; in 1898, 1,211 crates, of a value of £2,059; in 1899, 837 crates, of a value of £1,610. In 1899, 735 crates poultry, £1,486; other birds, 102, value £124. Eggs: 1895, 359,881 dozen, valued £11,920; 1896, 777,651 dozen, valued £33,389; 1897, 941,782 dozen, valued £51,429; 1898, 1,027,967 dozen, valued £52,667; 1899, 1,199,562 dozen, valued £50,682.

FROGS AND FROG FARMS.

While not of the surpassing importance of some other productions, the annual "frog crop" is of much interest to epicures and others, and it is encouraging to learn that the crop this year promises to be an unusually large one, and the market price will not be exorbitant. Less than a quarter of a century ago only a few people ate frogs, but now almost everybody eats them, and they have become a regular and much-sought-for market article of food (says the Chicago *Live Stock Journal*). The opinion is also advanced that frog-farming is sure to become one of the most profitable of all our small industries, and already quite a large number are engaged in raising frogs for market. There is said to be a profitable "frog farm" within ten miles of New York city, the owner of which is able to live south during the winter on the profits of the industry. The frog expert of the Smithsonian Institute is quoted as saying that there are forty species of frogs known to the scientific world. Of these the largest is the gigantic "bellower," found in the swamps of Louisiana. This frog grows to 4 lb. weight, and is one of the choicest for table use. Next to the "bellower" comes the Potomac and New York frogs, both large and of superior flavour. It is, however, true that there is scarcely a State in the Union in which good table frogs cannot be found in abundance. The Government's frog expert will not acknowledge that Canada produces finer frogs than does our own country, but contends that in the marshes along the Potomac, the swamps of Louisiana, and the marshes and swamps of Pennsylvania and New York are to be found some of the finest and largest frogs. It is confessed, however, that our Canadian neighbours understand the art of preparing frog-legs for market in a manner superior to ourselves, and that this has brought the frogs of Canada into popular favour. The Canadians simply have the best of us in thoroughly understanding the art of skinning and preparing for market, while our frogs are superior both in size and flavour.

The Orchard.

FRUIT CULTURE IN QUEENSLAND.

By ALBERT H. BENSON.

CITRUS CULTURE—Part IV.

The Diseases of Citrus Trees.

Although no article on citrus culture can be complete unless it contains full information respecting the various diseases attacking citrus fruit trees and citrus fruits, I do not purpose dealing with the various pests from a technical standpoint, as this is a matter that comes within the province of the Government Entomologist rather than that of the Instructor of Fruit Culture, and will be dealt with fully by him. At the same time, in order to render this article as useful as possible, I purpose giving a short popular description of the various pests, and will describe the remedies and times of applying same, that have been found to be most efficacious for their destruction. I have already dealt with this matter in a general way in an article that appeared in the April number of the *Queensland Agricultural Journal* for 1899, when I gave a tabulated list of the principal diseases attacking the various fruit trees grown in this colony—giving suggested remedies for same, and illustrating the methods of applying those remedies both by spraying and cyaniding. The diseases of citrus trees may be divided into two great classes—namely, those caused by insects, and those that are due to the action of fungi.

Insect Pests.

Few trees are subject to the attack of so many kinds of insects as citrus trees. They are attacked by insects of various kinds—insects that live by sucking either the leaves, bark, or skin of the fruit; by insects that destroy the leaves, skin of the fruit, and bark of smaller twigs by actually devouring same; by insects boring into and destroying the fruit; and by insects boring into and destroying the branches, trunks, and roots of the trees. These various insect pests require different treatment, as a remedy which is very efficacious in the case of an insect that eats the leaves, &c., is of little use in the case of an insect that lives on the leaves by sucking them. Hence the necessity for classifying the various insects according to the manner in which they obtain their food.

1st. *Insects that Live by Suction.*

In this class all scale insects, aphides, mites, and sucking bugs are included. Of scale insects there are many species, of which the following are the most important and destructive :—

Red Scale (*Aspidiotus aurantii*).—This is one of the most destructive, if not the most destructive, insect that attacks citrus trees, as it attacks every part above ground, and, when present in sufficient numbers, destroys the tree. The mature female is about one-twentieth of an inch in diameter, round, and varying in colour from orange to orange-red. It is exceedingly prolific, and under favourable conditions it spreads with great rapidity, attacking the leaves, fruit, twigs, branches, and trunk of the tree. It seems to poison whatever it touches, and when young wood becomes badly infested it soon dies. In districts where this scale is unknown, or is only present in small numbers, every care should be taken to prevent its becoming firmly established, as it is one of the most difficult scales to kill, owing to the fact that the insect is so well protected by its scale and the parchment-like covering of its under surface

The best remedy I have ever used for this insect is the treatment by hydrocyanic acid gas, but spraying with mixtures A, C, and D—full particulars of making which are given at the end of this article—is efficacious when properly carried out. In order to obtain the best results from spraying in the case of red and other scale insects, the best time to apply the spraying mixture is in November and December, when the young scales are hatching out in the largest numbers from under the mother scales. The young insects are then more or less unprotected, and are consequently much more easily destroyed than the fully protected mature insects. As all the young scales do not hatch out at once, the spring hatching season being usually of several weeks' duration, it is advisable to spray the trees several times during this period, as no single application is efficacious. The best time to give the first spraying can easily be determined by carefully examining the infested trees with a good magnifying glass, by means of which the young scales will easily be seen, either running about or newly attached to the leaves, branches, or skins of the young fruit. Spraying, to be efficacious, must reach every part of the tree and both the upper and under sides of the leaves. The nozzles used should produce a very fine, mist-like spray, and should be so arranged that they will throw the spray in any direction. It is not necessary to regularly drown the tree with the spraying mixture, as this entails a great loss of material, and consequently extra expense; and at the same time it does not do as good work as a smaller quantity more evenly distributed; as a fine, mist-like spray will remain on the tree when an overdose will run off. No matter what spraying mixture is used, care must be taken to prevent any large quantity from running down the trunk of the tree and accumulating round the collar at the surface of the ground, as if this takes place it is very apt to injure the tree by causing either a partial or complete ringbarking. In order to prevent this, it is a good plan to place a thick bandage round the trunk of the tree, near the ground; such bandage to be made from an old blanket, or similar material, which will absorb the surplus spray and thus prevent its accumulation near the collar. Another plan is to remove all the saturated soil from around the collar of the tree immediately after spraying, and replace same with fresh soil. When spraying, always do the work carefully, even if it takes twice the time, as one thorough spraying is worth several indifferent applications.

Circular Black Scale (*Aspidiotus ficus:* Purple Circular Scale).—This insect is similar in size and shape to the Red Scale, but differs from it in its colour, which is black, and also that it is principally found on the leaves and fruit. Like the Red Scale, it is extremely prolific; a few mature insects in spring rapidly multiplying till the leaves and fruit are completely covered. It is not general throughout the colony, so that every care should be taken to prevent its introduction into clean districts. Its effects on the tree, except when present in large numbers, are not so severe as that of the Red Scale, but it renders the fruit unsightly and unsaleable, as the black colour of the insects makes them very conspicuous. Fruit attacked by this scale must be scrubbed before it is fit for marketing, and this, besides being a very expensive process, injures the keeping quality of the fruit. The cyanide treatment is very efficacious in the case of this insect; few, if any, being left alive if the tree has been properly treated. Spraying with the same mixtures as those recommended in the case of the Red Scale—viz., A, C, and D—is also efficacious when properly carried out, but several applications are necessary.

White Scale (*Chionaspis citri:* White Louse).—This insect gets its name from the colour of the male, which is white. The shape of the male insect is that of a minute fluted cylinder, and they are often present in such large numbers as to give the trunk and main stems of the tree the appearance of having been whitewashed. The female insect is mussel-shaped, and of a brownish colour, so that it is often unnoticed on the bark of the tree, but can be easily seen on the leaves or fruit. White Scale attacks every part of the tree from the ground to the tops of the branches as well as the leaves and fruit, and its effects

when present in large numbers are very noticeable. As a rule, this insect makes it appearance at or near the surface of the ground, and gradually spreads upwards from the trunk to the main branches, and from these to the smaller branches, twigs, leaves, and fruit. Sometimes only one main limb is attacked, the rest of the tree being comparatively free, but in other cases the whole tree is covered from top to bottom. This scale renders the fruit very unsightly, often causing it to be somewhat malformed, and at the same time checking its growth. Although it is by no means an easy insect to destroy, cyaniding is a most effectual remedy; destroying every male or female living insect on the tree at the time of treatment, as well as a very large proportion of the eggs.

In addition to cyaniding, the following are good remedies:—Painting or spraying the trunk and main branches with G, and spraying the whole of the tree several times with A, C, or D.

Glover Scale (*Mytilaspis Gloveri:* Long Mussel Scale).—Like the Circular Red Scale, this insect, when present in large numbers, kills the twigs and smaller branches of the trees that it attacks, and in the case of badly neglected trees it kills outright. It is a long, narrow, mussel-shaped scale, of a pale-brown colour, and attacks every part of the tree and fruit, but is usually present in the greatest numbers on the top of the tree, where its effects can be traced by dead branches and stunted growth. It is found in many parts of the colony, and unless present in large numbers is often unnoticed, as it is not a conspicuous insect. Although not conspicuous, it is, as already stated, very destructive, and should be destroyed wherever seen. Cyaniding has also proved very efficacious in the case of this insect, and spraying with A, C, and D is also recommended.

Orange Mussel Scale (*Mytilaspis fulva*, or *citricola:* The Purple Scale of Florida).—This is the mussel-shaped scale found on lemons imported from Southern Europe, where it is found to be one of the worst pests of the lemon. In this colony it is only present in a few districts, but I am sorry to say that it is spreading fast, as instanced by the number of samples of citrus fruit infested by this insect that have been offered for sale in Brisbane during the past season, and reported by the inspectors of the Diseases in Plants Act. In shape it is broader, shorter, and more curved than the Glover Scale, and is distinguished from that insect, and also the female of the White Scale, by its effects on the fruit, and also by the fact that it is often found on the fruit and leaves in dense masses, varying from half-an-inch to an inch or more in diameter. Fruit attacked by this scale is easily distinguished on account of its having a mottled or blotched appearance, the blotches being of a dull green colour. These blotches are caused by the scales, and are characteristic of this particular insect. This scale attacks every part of the tree, increases rapidly, and is very deadly in its effects. It is an exceedingly difficult insect to kill, owing to the toughness of its covering and the closeness with which it attaches itself to the fruit, leaves, or wood of the tree. When on the fruit it is by far the most difficult scale insect to remove by means of scrubbing, as it is so firmly attached, and is always present in the greatest numbers on those parts of the fruit which are most difficult to clean; such as the stem cavity and the creases surrounding the stem cavity. In California no spray has been found efficacious for the destruction of this scale, the only certain remedy being cyaniding, and even this has required to be applied twice with a short interval between the applications in order to obtain the best results, as the eggs of this scale are so well protected that a number escape being killed, thus necessitating a second application when the young insects hatch out. None of the sprays that I have tried are satisfactory in the case of the mature insects or eggs, but the following will destroy the young when they are first hatched out, viz.:—A, C, and D. As the young scales rapidly develop their protective covering, no spray can be effectual unless it is frequently applied, so as to catch the successive crops of young insects as soon as they hatch out.

As this scale is so far confined to a few districts, every care should be taken to prevent its spreading, as, once it gets a fair hold of the citrus orchards of Queensland, it will be found to be a very difficult matter to keep it in check.

Parlatoria Scales (*Parlatoria* spp.)—These scales somewhat resemble the Red Scale both in their appearance and effect, with the exception that instead of being round they are elliptical in shape and also of a darker colour. They also differ from the Red Scale in that they are principally confined to the leaves and branches of the tree, which are killed back when these insects are present in large numbers. These scales are not so frequently met with as the Red, Circular Black, White, and Glover Scales; still, as they are very destructive when they become numerous, they should be kept in check whenever they are found. The best means of doing this is by the application of the remedies that are recommended for the destruction of the Red Scale, as those remedies are equally efficacious in the case of Parlatoria Scales.

All the scales that I have mentioned so far are comparatively small; all are difficult to exterminate or even keep in check without exercising considerable care and attention, and all do a large amount of damage to the trees that are infested by them. At the same time, none of these scales exude honeydew, and consequently they are not accompanied by sooty mould or fumagine. The following scales, however, exude large quantities of honeydew, and when present on the trees in large numbers are always accompanied by more or less sooty mould or fumagine. Though not so deadly in their effects on the tree itself, and seldom attacking the fruit, these scales retard the growth of the tree, and the fumagine, which always accompanies them, accumulates to such an extent on the leaves as to prevent them from performing their proper functions, and renders the fruit so unsightly that it has to be washed before it is fit to market.

Lecanium Scales (*Lecanium* spp.)—Many species of Lecanium are found on citrus trees, of which the principal are the soft, depressed, long, black, and hemispherical. The different species of Lecanium differ considerably from each other in size, shape, and colour. Some are round and prominent, others oval and flat. In colour they they are generally either brown or black, but the young scales are all of a dirty yellow or yellowish green colour. The young scales are all soft, their scale covering being quite thin, but the mature insects of some species, such as *Lecanium oleæ*, "the Black Scale," develop a hard and strong covering. All the scales of this family are very prolific, a few mature females producing so many eggs that the branch to which they are attached is soon completely covered with their progeny. Lecanium Scales seldom attack the fruit and main branches, and only some of the species attack the leaves. They usually attack the small twigs and branches, often clustering around them in dense masses. They are accompanied by numerous ants, and followed by a large quantity of sooty mould or fumagine.

These scales appear to breed throughout the whole year, as you always find them in every state of development, from the newly hatched out larvæ to the mature female full of eggs and newly-hatched larvæ. It is, therefore, a difficult matter to do first-class work with one application of cyanide, or by one spraying, as there are always a number of fully-developed eggs that are not killed. A second cyaniding of badly infected trees, given within a month of the first application, is a thoroughly effectual remedy. All the immature scales are easily destroyed by spraying—sprays containing kerosene being the most efficacious—but where other scale insects are present, the remedies used for them usually destroy any Lecaniums with which they come in contact. When Lecaniums have to be sprayed for specially, then mixtures B and C are to be recommended; a second spraying to follow the first within three weeks, so as to catch the young scales which have hatched out from the eggs which were not destroyed by the first treatment.

Pink Wax Scale (*Ceroplastes ruber*).—Few insects have spread to such a large extent in this colony within the last ten years or attacked so many widely different kinds of fruit and forest trees as the Pink Wax Scale. Within a radius of 50 miles from Brisbane, few orchards are free from this pest, and it is also met with at different places along the coast, notably at Rockhampton and Cairns.

This insect is so well known as to hardly need describing, still, as it has not yet made its appearance in some districts, a short description will enable anyone to recognise it, and, if in a new district, to take immediate steps for its eradication. The mature insect is the shape of an irregular hemisphere, varying from an eighth to three-sixteenths of an inch in diameter. As the name implies, the scaly covering of the insect is composed of a pale pinkish coloured wax, which encloses the scale proper, for which it provides very strong protection. I have never seen this insect on the fruit, only on the small twigs and leaves. On the leaves it is usually found attached to the mid-rib, either on the upper or lower side; the scales being often so numerous as to overlap each other. It is usually much more numerous on mandarins than on oranges, and more numerous on oranges than lemons, though if you want to find it in perfection, you will do so on the Mango. Like the Lecaniums the wax scale can generally be found on the tree in all stages, and there are always a few hatching out. There are two great hatchings—a spring and autumn hatching—when the young hatch out in countless numbers and overrun everything within their reach. The spring hatching in the neighbourhood of Brisbane varies according to the season, but extends generally from the end of September till the middle of November. As the young scales hatch out, they travel to the fresh leaves of the season's growth on which they can be seen clustered in large numbers along the mid-rib. At first the young scales are very minute, and have only a slight protective covering of wax, but they increase in size rapidly, and are soon well protected.

The autumn hatching takes place in March, when the young scales attach themselves to the young leaves and twigs of the summer growth. There are only two periods of the year that spraying can be carried out with success, that is during the hatching times, as the fully matured insects are not easily killed. As in the case of Lecaniums, two or more sprayings should be given during each of the hatching periods in order to obtain satisfactory results, as it is impossible to get all the insects in the right condition at any one time. The following sprays have been found most efficacious for the destruction of this scale—viz., a mixture of A and B and D. Cyaniding destroys every insect on the tree that is in a state rendering it possible to be killed at the time of application, but unless used at a strength that will injure the tenderer parts of the tree, it will not destroy all the mature females, especially during the months of July, August, and September. The mature females are then full of eggs, and apparently in a dormant condition, as well as being practically hermetically sealed, so that the gas has no chance to get at them.

Pink Wax Scale is always accompanied by fumagine, especially late in the season; badly infected trees being one mass of black, sooty mould. There is another wax scale closely related to the pink—viz., the White Wax Scale (*Ceroplastes cerifera*); but so far it has not attacked citrus trees to any extent. In this colony it is found chiefly on the duranta, but in New South Wales it attacks a number of trees and plants, both native and introduced. Should it become a pest in this colony the same remedies that are efficacious in the case of the Pink Wax Scale will be equally efficacious in destroying it. There are several other scale insects that are occasionally met with on citrus trees, such as *Pulvinaria* spp., *Icerea purchesi*, &c., but they are rarely present in sufficient numbers to do any amount of harm, and do not call for any special treatment other than those already described.

APHIDES.—These insects sometimes do a considerable amount of damage to the young growth of citrus trees, especially newly-planted trees, but they also attack succulent growth on trees of any age. They usually make their appearance during periods of active growth, such as the main spring and summer growths of citrus trees, and as they breed exceedingly rapidly they soon do a lot of damage. Like scale insects, they live by suction, hence remedies to be efficacious must kill them by actual contact, and for this purpose nothing beats the whale oil soap and black leaf tobacco extract, made as

follows:—Dissolve ¼ lb. whale oil soap, 80 per cent., in 1 gallon of water, and add 1 to 2 fluid oz. of black leaf tobacco. If the soap is found to injure the growth in any way the tobacco extract can be used alone.

Maori (*Phytopus*, sp.: "Orange Rust Mite").—This minute insect makes its first appearance on the fruit when it is about 1 inch in diameter, and its presence is first shown by the young fruit becoming of a dull silvery colour, which turns first to light brown and finally to a dark brown, almost black colour. A good magnifying glass is necessary in order to see these insects and to determine when they first make their appearance. If this is found out they are then easily destroyed, either by dusting the tree with sulphur or by giving two or three sprayings with a weak soap wash, such as 1 lb. of 80 per cent. whale oil soap to 8 gallons of water.

In addition to the Maori there are several species of mites and spinning mites, such as "Red Spider," which do more or less damage to the leaves and young fruit, but they can be kept in check by the use of the remedies recommended for Maori.

Sucking Bugs ("Green Orange Bug," "Bronzy Orange Bug").—These insects are well known to all orange-growers, on account of their abominable smell, and also on account of the accuracy with which they can discharge their stinking secretion into the human eye. They do considerable damage to young fruit and young twigs by piercing them with their sucking-trunk, and extracting their juices, causing the fruit to fall and the young twigs to die. The young insects are killed by any of the stronger sprays used for the destruction of scales, but the maturer insects are not easily injured. The best remedy is to gather and destroy all that can be found, and, where the trees have been properly pruned, the insects can be driven to the centre of the tree by tapping the outer branches, and can be swept from there on to a sheet and be gathered up and destroyed.

Sucking Moths.—There are two ways of fighting these pests. The first is to destroy all the plants that feed the caterpillars that turn to the moths; and the second is to attract the moths with ripe Cavendish bananas. The bananas should be hung up in conspicuous places amongst the orange trees, and should be treated with arsenic, so that the moths sucking them are poisoned; or, if this is considered dangerous, then large numbers of moths can be caught by going round at night with a lantern and net to the trap-fruit and the trees that are attacked.

2nd. Insects that Destroy Foliage, Skin of the Fruit, &c.

This class includes all those insects that actually devour their food, other than those to be presently dealt with, as distinct from those that we have been considering, which live by suction. For the whole of these insects there is one great remedy—viz., to poison their food; and the best means of doing this is to spray the tree with an arsenical preparation such as Paris green, E, or arsenic and lime, F. The former substance, as sold in Queensland, is of very uncertain strength, and is therefore often unreliable. Growers should always ask for pure Paris green, that known as Blundell's being the best obtainable, Paris green is used in the proportion of 1 lb. to 160 gallons of water, either alone or in conjunction with lime or Bordeaux mixture.

Instead of Paris green a mixture of white arsenic and lime is being largely used in the United States of America, and has been tested by me with good results. It is made by boiling 1 lb. of white arsenic and 2 lb. of lime in 3 gallons of water till the arsenic is converted into an insoluble arsenate of lime, which will not injure the foliage, as would be the case were free arsenic used. This quantity is sufficient for 160 gallons of spray. See F.

The principal leaf-eating insects attacking citrus trees are crickets, grasshoppers, beetles, caterpillars, and a small weevil which is often present in such numbers as to honeycomb all the leaves on the lower branches of the tree. There is also a green grasshopper which eats the skin of the fruit, causing an

unsightly blemish. Many leaf-eating insects are encouraged by allowing seeds and rubbish to accumulate in the orchard, as such forms a good harbour for them; so this is another reason for keeping the orchard clean.

3rd. Insects Boring into the Fruit.

The Fruit Fly.—This insect is often very destructive to citrus fruits, especially early or very late in the season, the mid-season fruit being usually free. The only remedy is to destroy all varieties of worthless fruit growing in or adjacent to the citrus orchard, never allowing any infected fruit to lie about on the ground, and the destruction of every mature insect and infected fruit whenever found, especially early in the season. It is impossible to too strongly emphasise the importance of taking these preventive measures, as, if they are neglected, they will cause very serious loss to the grower.

The Peach Moth (commonly known as the "Borer Moth").—During the last three years this insect has done a considerable amount of damage to the ripening fruit, both oranges and mandarins. Very little has been done, so far, to keep it in check, or to try and prevent its ravages; but it threatens to become such a serious pest that stringent action will be necessary. Like the Codlin Moth of the apple and pear, this moth lays it eggs on the surface of the fruit, especially in protected spots, such as the stem or where two fruits touch. The young caterpillar hatches out, and starts to eat into the fruit; and as we have found spraying with arsenical poisons an effectual remedy in the case of the Codlin Moth, which works in a similar manner, I recommended spraying with similar washes E and F in the case of the Peach Moth. At the same time all infected fruit should be gathered and destroyed. I am not satisfied that this is the only method of treatment, and purpose carrying out a number of experiments during the coming season to see whether it will not be possible either to trap or poison the moth or protect the trees from its ravages.

4th. Insects Boring into the Tree.

The larvæ of several species of beetles do considerable damage to citrus trees by boring into either the trunks, branches, or roots. For this there are several remedies, the first and most important of which is to have the inside of your trees thoroughly well pruned out, so that if any borers are at work their presence can be detected before they have done serious damage. The next remedy is to destroy all elephant and longicorn beetles that may be seen on the trees at any time. When the borer is in the tree, the best way to get rid of it is either to run a pliable wire into the hole and through the insect, or if the wire fails to reach it, then to inject a little kerosene into the hole by means of a small oil can, and then plug up the hole with a bit of wood.

Fungus Pests.

1st. Fungi Attacking the Fruit.

Quite a large number of minute microscopic fungi attack the skins of citrus fruit, but as the remedy is practically the same for all of them, I will only deal with the two most important—namely, Melanosis and Black Spot or Black Brand.

Melanosis is very similar in appearance to Maori with this difference, that in the case of Maori the skin is quite smooth to the touch, but with Melanosis it is distinctly rough. Melanosis greatly disfigures the fruit and prevents it developing, the result being a lot of undersized, unattractive fruit. Melanosis also attacks the leaves, discolouring them in a similar manner to the fruit. The remedy is to spray the tree with Bordeaux Mixture (see Mixture H) first just before the tree comes into blossom in spring and again when the fruit is set.

Black Brand or Black Spot.—This disease appears to attack all kinds of citrus fruit, but it is especially destructive to the orange and lemon. In the case of the orange, it seldom attacks any except the ripe fruit, but the lemon

is attacked whilst still green. The appearance of the infected fruit is very characteristic, a number of irregular-shaped spots being seen all over the fruit, that look at first sight as though they had been burnt in with a hot iron, hence the name Black Brand. Bordeaux Mixture is an effectual remedy for this disease, as is also Ammonia Carbonate of Copper—Mixture I. These two fungicides are effectual remedies for all the fungus diseases attacking the skins of citrus fruits.

2nd. Fungi Attacking the Trunk and Branches.

Bark Fungi of Branches.—There are several species of bark fungi all more or less injurious. Some are in the form of greyish or brownish blotches, others are cankerous growths, and the one that is the most destructive shows a quantity of long whitish roots like cobwebs running down the branch that is attacked. Unless this last disease is taken in time it always kills the limb that it attacks, and sometimes the whole tree.

The first great remedy for all bark fungi is to prune out the centre of the tree thoroughly, so as to let plenty of air in, and so that as soon as bark fungus makes its appearance it can be detected and steps taken for stamping it out. When bark fungi have already begun killing the bark it is necessary to use the knife freely, cutting away any diseased portion and covering the wound with limewash, or, if a very severe wound, binding it up with a mixture of cowdung and clay.

These remarks apply also to the treatment of root or collar rot, which, if neglected, always kills the tree, but if taken in time and the knife is properly used, can be cured, provided that the tree is growing on suitable soil, as, if planted on badly drained clayey soil, no treatment will prevent or cure collar rot. In addition to bark fungi the trunks and branches of citrus trees are often covered with various species of moss and lichens, but these are all destroyed by the remedies used for bark fungi. The best of all sprays is the Bordeaux Mixture (H), but the paint (G) is also a very effectual remedy.

3rd. Fungi Attacking the Roots.

In new land citrus trees are sometimes found to die off for no apparent cause, but when dug up they are found to have all their roots rotten, and covered with a white network of fungus roots. These roots are the mycelium of several species of mushrooms that live on rotting wood; and when the orange tree is planted right alongside of a rotting root or stump having this fungus the fungus is apt to go from the rotting root or stump to the live roots of the citrus tree. This disease is difficult to guard against in newly cleared land, but when discovered the best remedy is to dig out the infected root or stump and mix a quantity of fresh lime with the soil.

REMEDIES.

A.—Resin Wash for Scales.

Take 20 lb. of resin, 6 lb. of caustic soda (70 per cent.), 3 pints of fish oil, water to make 80 gallons; place the resin, caustic soda, and fish oil in a large boiler with 20 gallons of water, and boil for three hours; then add hot water slowly, and stir well till there are at least 40 gallons of hot solution; then add cold water to make up the total to 80 gallons. Never add cold water when cooking, or the resin will be precipitated, and it will be difficult to get it in solution.

B.—Kerosene Emulsion.

Take 2 gallons of best kerosene, 1 gallon of boiling water, and 8 oz. of soft soap. Dissolve the soap in the boiling water; when dissolved, add the kerosene and churn the mixture with a spray pump or syringe for fully ten minutes, so as to get the oil and water thoroughly emulsified, when the mixture becomes stable and the oil will not separate from the water, even when kept for a considerable time. If the oil is not thoroughly emulsified and there is free

oil present, it is apt to injure the foliage when applied, and if free oil gets on to the roots of the tree in any quantity it will probably kill the tree; therefore it is always best to be on the safe side, and be sure that you churn the mixture till it is properly emulsified. The strength at which it is to be applied is 1 gallon of emulsion to 7 gallons of water. It can be used by itself or if the trees to be sprayed are covered with fumagine—the sooty fungus which always accompanies certain scale and other insects—it can be used in conjunction with as thick a solution of starch as can be got through the nozzle of the pump. The starch solution is made by making a paste of flour the same as that used by bill-stickers, and straining it carefully from all lumps. The combined mixture forms a thin coating over the scales, leaves, branches, fruit, &c., which peels off when dry, taking the dead scales and fumagine with it, and leaving the trees clean.

C.—Pure Kerosene.

Pure kerosene and water, mixed together by means of the special attachment supplied with the Doncaster spray pump

The proportion used varies from one part of kerosene to from 10 to 20 parts of water, according to the condition of the tree and the scale to be killed.

Care must be taken to prevent the kerosene from accumulating at the collar of the tree, as if allowed to do so it will seriously injure the tree.

D.—Stockholm Tar, Whale Oil, and Caustic Soda Wash.

Boil 1 gallon of Stockholm tar, 1 gallon of whale oil, and 6 lb. of caustic soda (70 per cent.) in 10 gallons of water for half-an-hour; then add water to make 50 gallons, and apply.

E.—Paris Green.

This is the best remedy for all insects that actually devour their food. It is a powerful arsenical poison, and a good sample should contain at least 50 per cent. of arsenious acid. It is generally used by itself, but if desired it can be used with lime, in the proportion of 1 lb. of Paris green to 4 lb or more of lime. Mixing it with lime tends to make it less dangerous to handle, and will not interfere in any way with its action. It can also be used in conjunction with Bordeaux Mixture. The best way to mix Paris green with water is to place it in a cup or billy with a little cold water and thoroughly moisten every particle, the same way as mustard is mixed up for table use; then add more water gradually, stirring well whilst doing so, till it is thoroughly mixed; then add the requisite quantity of water. Paris green is used at a strength not exceeding 1 lb. to 160 gallons of water. It must always be kept well stirred whilst in use. It must not be sprayed on during rain, sunshine, or heavy drying winds. It should not be applied to either fruit or vegetables within a month of the time of gathering. It should be handled with care, and kept out of the way of children. It should always be applied as a very fine spray, and persons spraying should take care not to inhale too much of the spray.

F.—White Arsenic and Lime.

White arsenic	1 lb.
Unslacked lime	2 lb.
Water	3 gallons.

Slowly slack the lime, add the arsenic, put in the water, and boil for one hour. Add 160 gallons of water, and it is ready to use. In making this mixture be very careful to boil thoroughly, and if the lime is not of good quality increase the quantity.

G.—A Paint for the Trunks and Main Branches.

Boil 2 lb. of sulphur and 1 lb. stone lime in 2 gallons of water for an hour and a-half. Then add 3 lb. more stone lime and boil half-an-hour. Make up with boiling water to 2 gallons, and add enough fine flour or fine clay to the mixture to make it of the consistency of thin paint.

H.—Bordeaux Mixture—A Fungicide.

Winter Strength.—6 lb. bluestone, 4 lb. of unslacked lime, 22 gallons of water.

Summer Strength.—6 lb. bluestone, 4 lb. of unslacked lime, 40 gallons of water.

Prepare as follows (for the 40 gallons solution, the 22 gallons solution in proportion):—

(1) Dissolve 6 lb. of bluestone in 20 gallons of cold water in one cask, by placing it in a bag and suspending it in the water.

(2) Slack 4 lb. of unslacked lime in another cask slowly by first pouring about 3 pints of water over it. This will reduce the lime to a thick cream free from lumps. Water should now be added, stirring well till there is 20 gallons of milk of lime in the cask.

(3) Stir the milk of lime up well, strain it, and pour the whole of the 20 gallons of milk of lime and the 20 gallons of bluestone water together slowly into a third cask; stir well for 3 minutes, and if properly made the mixture is fit for use.

The mixture is much better if made in this manner than when a strong solution of bluestone and lime are first mixed together, and water to make up the required quantity is afterwards added.

In order to see if the mixture is properly made, plunge the blade of a knife into it for a minute. If the knife is untarnished the mixture is all right; but if the knife is stained a coppery colour, then more milk of lime must be added.

The mixture should always be neutral, as if there is an excess of bluestone it is apt to injure the foliage. Use water that is free from iron, and do not make the mixture in iron, zinc, or tin vessels of any kind—wood is the best.

If desirable, a stock solution of bluestone may be kept on hand for use as required. Such a solution may be made by dissolving 100 lb. of bluestone in 50 gallons of water. Place the 100 lb. of bluestone in a bag and suspend it in the cask of water, and in the course of a couple of days the whole of the bluestone will be dissolved, and each gallon of the solution will contain 2 lb. of bluestone.

To make the 40-gallon solution you therefore take 3 gallons of the stock solution of bluestone, and add 17 gallons of water to it, to make up the 20 gallons of bluestone solution for mixing with the 20 gallons of milk of lime as previously described. A stock solution of milk of lime can also be made, but it is better to make it as required.

Bordeaux Mixture is a fungicide, and it is of little value as an insecticide. It, however, combines well with arsenical poisons, in which state it is a very good combined spray.

I.—Ammonia Carbonate of Copper.

Dissolve 3 oz. of carbonate of copper in 1 quart of strongish liquid ammonia (sp. gr. ·880), and add 22 gallons of water.

THE PINEAPPLE.

The *National Druggist* says that it is a notorious fact that the pineapple is considered the least healthy of all the edible fruits of the tropics by those who know anything of the matter. The juice of the green and growing plant is accredited in Java, the Philippines, and throughout the East generally, with being a blood poison of a most deadly nature. It is said to be the substance with which the Malays poison their creeses and daggers, and is also accredited with being the "finger-nail" poison in use among aboriginal Javanese women almost universally.

It is a remarkable fact that, although the pineapple flourishes and is produced abundantly along the whole seaboard of Queensland, the adult coast-dwellers eat very little of this fruit. When European fruits, or rock and water

melons, passion fruit, and pineapples are served for a dessert, it is rarely that the latter are cut, most persons preferring apples, pears, passion fruit, and melons. Only last week we noticed at a show luncheon several dishes of sliced pineapple interspersed with plates of oranges and apples. The latter were all eaten, but the pineapple remained untouched Is there any instinct in this? Probably if pineapples were a guinea apiece, everyone would want a slice, but at 1d. and 2d. pineapples become vulgar.

APPLES WITHOUT PIPS.

The Government Fruit Expert, Mr. A. H. Benson, has been strongly recommending the growing of seedless oranges in this colony, as well as growing a variety of seedless lime—the Tahiti, a fruit which grows to twice the size of the ordinary West Indian lime. In America several persons have been experimenting with a view to produce seedless apples and seedless pears, and have succeeded in doing same, and producing fruit said to be of first-class quality.

THE FRUITGROWING INDUSTRY.

A PRACTICAL TEST.

A WORD FOR THE DEPARTMENT OF AGRICULTURE.

Mr. A. S. Lang, 177 Queen street, writes to the *Brisbane Courier* as follows:—An old proverb points out that an ounce of practice is worth a pound of theory. I have much pleasure in giving some experience of my own with regard to the cyanide treatment of the citrus tree. I had been trying with more or less failure to keep down scale by syringing, but, noting the good effects elsewhere, was stimulated to try the new process. I have just treated 240 trees a little over two years old, ranging in height from 2 feet to 5 feet, with the most satisfactory results. The trees were covered with a tender growth 2 inches to 4 inches in length, yet only in a few instances has this been even scorched, and that but slightly. The dose applied was $\frac{1}{4}$ oz. of cyanide, $\frac{1}{2}$ oz. acid, and 1 oz. water, with tents 5 feet by 3 feet 6 inches. Of course older trees will take bigger tents and larger doses, but the proportion should be as stated. I put through sixty trees from sundown to midnight with the assistance of one man and the use of four tents. Each tree remains covered for twenty minutes, and with a little practice two hands—and heads—could easily work five tents on even larger trees. The cost of material was about 1d. per tree. The work being done after dark, the labour counts for very little when a man is working his own place, as a few trees can be treated every evening by way of amusement when the day's work is over. It is advisable to use tents to the large side; time is then saved in trying to force them over the trees, and the risk of breaking down young growth is avoided. I may also mention that out of 130 young trees which I planted last Easter only one has died. They were all from the nursery of Mr. Smith, of Montville, *viâ* Palmwoods, who cyanides before delivery, by way of prevention. This is further proof that the treatment does not injure the tree, however young it may be; and I can vouch for its deadly effect upon the scale, which does not show on any of the trees treated before planting; and, as already stated, it has conquered the enemy when applied to those of older growth. I furnish these particulars not only for the benefit of brother fruitgrowers, but as an acknowledgment due to the Department of Agriculture for the good work it is accomplishing. Being aggressive, it meets with a lion's share of criticism, and has to fight its way, not only against ignorance, which it deals kindly with, but against foolish prejudice, often cantankerous, and closed against conviction. Mr. Benson is to be congratulated—I have never spoken to him on the subject—on the perseverance which I am told he has shown in this matter. The Department, if it has done nothing else during the last twelve months, has more than vindicated its existence by the introduction of the cyanide treatment. Should any desire further particulars they may apply to me, either personally or by post, as I consider it is only a duty to help where possible in such matters.

Viticulture.

SUMMER PRUNING.

By E. H. RAINFORD,
Viticultural Expert.

A former article on this subject is reproduced for the benefit of those who have not read it.

Very shortly that part of the cultivation of the vine known as summer pruning will be required in the vineyard, and a few hints on the subject may be acceptable to some of our viticulturists. Summer pruning may be divided into three separate and distinct operations, which will be dealt with seriatim.

1. *Disbudding.*—The operation known as disbudding is very necessary to the welfare of the vine, as it consists in relieving it of all the vegetation which carries no fruit, with a few exceptions; but it is in the choice of these exceptions that the judgment must be exercised. All vines, some more than others, put out every spring a number of suckers and water shoots that carry no fruit, and if not removed diminish the vigour of the vine and affect its fertility next season. Moreover, these shoots, if not summer pruned, will have to be winter pruned, and the latter operation leaves a scar far more difficult to heal than the former. All suckers and water shoots from the stock should be removed unless it is required to reform the stock, in which case the shoot best placed is left for that purpose, and the others removed. In cases where a vine has been badly pruned and allowed to straggle too far, with consequent weak growth from the spurs, it is often advisable to leave a strong well-placed water shoot from the stock, cutting the cane back next winter, and subsequently reforming the vine on it. Occasionally a vine, both bush and trellis pruned, will produce each spring a large number of water shoots, but with a weak vegetation from the spurs. This shows that the sap circulates with difficulty at the spurs, probably from bad pruning and dead wood. When this occurs, choose the best-placed water shoot to reform the vine next season, as mentioned above, removing all others from stock.

It often happens that a bud will start at the base of a spur that has already become elongated and knotty; if so, be careful to preserve that shoot, as it will be useful next pruning for reforming the spur. As new wood is always more productive than old, any shoot that can be utilised for that purpose should be carefully preserved. When vines are pruned goblet fashion, preserve those shoots which will fill up a gap in the spurs or improve the shape of the vine, and disbud all others that carry no fruit.

The correct time for this operation is just before flowering. Do not delay it too long; otherwise the removal of the shoots will cause a scar or wound more difficult to heal.

With disbudding is connected the operation of leaf-stripping, which, although useful in cases, should be very cautiously performed. During the time of flowering, aeration is necessary for the fruit to set well, and when the flower is thickly set round with leaves a few of these may be advantageously removed; but beware of overdoing it, and leaving the flower too much exposed to the sun's rays—better too little than too much.

2. *Pinching.*—This operation is advantageous, for two purposes—firstly, to assist the setting of the fruit, and, secondly, to balance the growth from the spurs. Some vines are very bad for non-setting their fruit, and some will become so when planted in certain soils and situations. The cause is to be found in the extreme vigour of their vegetation, which has the effect of disorganising the fecundation of the flowers. There are other causes for non-setting, but at present only this is under consideration. When a vine with

strong vegetation is a persistent non-setter, the shoots should have the extremities nipped off with the thumb-nail at flowering time. The check given to the growth of the shoot greatly assists the setting of the fruit. Before long, a number of laterals will appear. All these should be removed with the exception of the upper one, which will continue the growth of the shoot as if it had not been pinched.

When vines are pruned on the uni-lateral and bi-lateral cordon system, or on the single and double fruit-rod systems, the extreme spurs or eyes vegetate first, and are liable to absorb the bulk of the sap and prevent some of the other eyes bursting. Pinching these shoots is then advantageous, as by checking their growth the other eyes are able to burst and make a normal vegetation. But here the pinching must be done earlier, when the shoots are a few inches long and the delay in the bursting of the other buds is becoming apparent. The same subsequent removal of laterals should be practised as for non-setting. Except in these two cases, do not pinch.

Topping.—If there is one thing more than another harmful to the grape crop in Queensland, it is the indiscriminate and irrational system of topping indulged in. The idea popularly entertained that it forces the sap into the bunches is utterly erroneous, and in most cases the practice impairs the quality of the grape instead of improving it, especially when, as has been seen by the writer, the shoots are lopped off just above the bunch. Leaves are the manufacturers of those materials which compose fruit—starch, glucose, acids, &c. The leaf-cells unite the atoms of carbon, oxygen, hydrogen, &c., to form those substances, and they are circulated by the sap to those various parts of the vine where they are required. To lop off the leaves is to lop off the factory. But, it is argued, new leaves come on the laterals; if that is the object, the primary leaves might just as well have been left. Besides, adult leaves are supplying the plant with food, and young leaves are dependent for this upon the old until they are adult themselves, and able to assist in supplying the plant; so there is a loss instead of a gain. When, as often happens, the topping is repeated several times, there is a constant drain upon the plant for food for the young leaves. Where, then, does the gain to the grapes come in? Again, this severe topping frequently leaves the bunches exposed to the sun's rays, which, during hot westerly winds, are powerful enough to paralyse the action of the cells; hence—wilting and uneven ripening. Grapes in Queensland require shade to ripen well, not sun; so do not top unless compelled to do so. Where vines are pruned bush fashion and cross-cultivated, vigorous vines will require some topping, but be as sparing with it as you can, and tie up to stakes preferably.

WINE AND MICROBES.

In a communication recently made to the Agricultural Society of France, M. Vassilière gave an account of a new process of preserving wine from the action of microbes which attack it when in the cask. When the wine is placed in a cask which has been left empty for some time, it is subject to deterioration owing to the action of the different microbes, these being propagated when the wine is in contact with the air. The expedient generally in use consists in burning sulphur in the empty cask to purify it. The experimenter proposes to remedy the difficulty by covering the wine with a layer of carbonic acid gas, which, being more dense, drives out the air and takes its place. The carbonic acid is liquified in tubes of chrome steel, provided with a reservoir in which it takes the gaseous form before passing into the cask; the reservoir is provided with a rubber tube, which descends into the cask, and also with a pressure gauge, by whose indications the supply of gas is regulated. By this method, very good results have been attained, and at a small cost.

VINE DISEASE IN PORTUGAL.

A despatch, dated 7th July last, has been received at the Foreign Office from H.M. Minister at Lisbon, reporting that most disquieting news comes from the vine districts in the north of Portugal in consequences of the ravages of the "Maromba," which has appeared in nearly every vineyard of the Douro region

The "Maromba" is a parasitic disease, the course of which was noted some four years ago by Monsieur Alfred Lecocq, when it first made its appearance in Portugal in a mild form.

As yet no definite remedy has been hit upon to counteract the evil or prevent its extension, but experiments are being actively made in the district, particularly on the estates belonging to the Crown.

One of the most troublesome features of this disease is that it attacks all classes of vines, including the American; while in some localities it has even affected the chestnut and almond plantations.

ASSISTANCE TO VITICULTURISTS IN RUSSIA.

Some people are inclined to think that in our Australian colonies, the State goes too far in assisting the development of agriculture and of other primary industries. It might perhaps surprise them to know that the most conservative Governments of the day in Europe—such as those of Germany and of Russia—are far ahead of us in the help they give to the development of their respective national resources. On this point Mr. Henry Tardent, Manager of the State Farm at Biggenden, says:—"Without entering into details, I will give only one instance which, if adopted here, would, I am sure, be greatly appreciated by our struggling vignerons. It is a free translation from the last number of *Zemdélié* (*Agriculture*) of a communication from the Russian Department of Agriculture *re* the free distribution of cultivated ferments. It runs about thus:—'In furtherance of last year's experiments, which have given entirely satisfactory results, the agricultural microbiological laboratory of the Minister for Agriculture will continue in future to distribute *free* to winemakers, and to farmers in general, pure cultivated ferments of the best *growths* from the most celebrated winegrowing countries with a view to their being used in the manufacture of grape and other fruit wines, as well as of mead. The laboratory will also do gratuitously the cleaning and renovating of lees and other ferments. It will investigate the defects in diseased and unsound wines, of which samples will be sent. To cure such wines the laboratory will, as much as possible, send directions and advice suitable to every special case. The abovementioned ferments will be sent in three different states—dry, semi-liquid, and liquid. In the two first instances, the invoice is entirely free with even carriage prepaid. In the third case, the addressee has to pay for the railage. The laboratory answers all written communications at the shortest possible notice. It is in addition open daily during a few hours for personal consultation.'"

AN AMPELOGRAPHY OF EXISTING VINES.

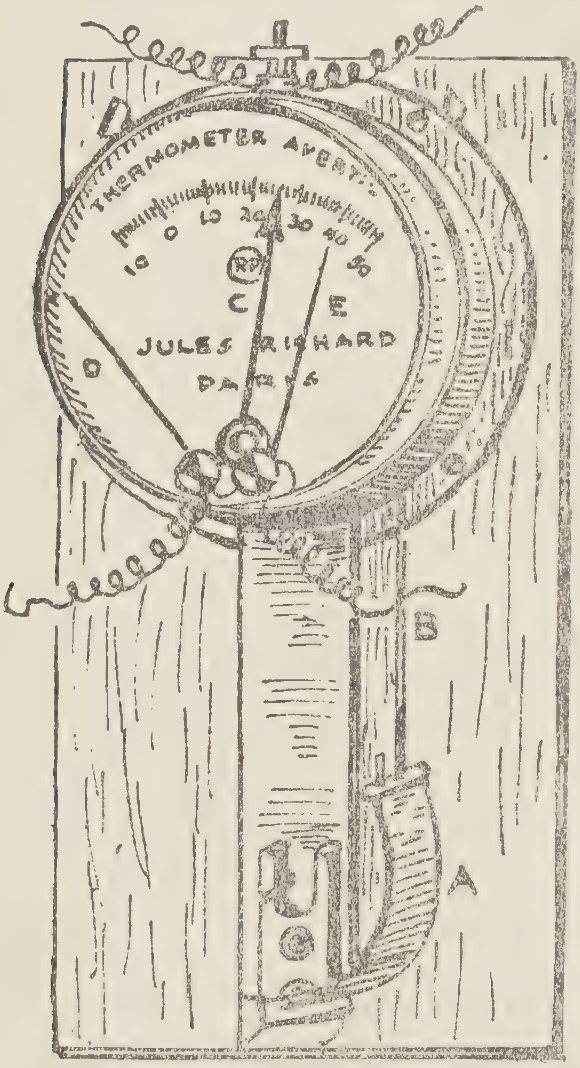
The Intercolonial Fruitgrowers' Conference, held in Brisbane a couple of years ago, unanimously adopted a proposition by Mr. H. A. Tardent, recommending the Governments of the Australian colonies to entrust to a commission of viticultural experts and botanists, the publication with coloured plates of a complete Ampelography, or description of all the vines existing in Australia. So far as we are aware of, no steps have been taken to give effect to that resolution. We now learn, however, that the International Viticultural Congress recently held at the Paris Exhibition have decided to publish a complete Ampelography of all the species and kinds of vines known, and have themselves appointed a committee of the best qualified men in every country to carry out the resolution.

AN ELECTRIC FROST ALARM.

In concluding an article on grafting and manuring vines, Leo Buring, in *Garden and Field*, gives the following interesting description of an electric frost alarm which has been successfully tried at the college in Geisenheim :—

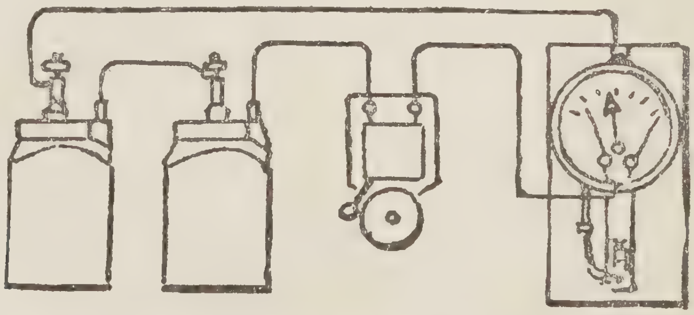
" Monsieur Jules Richard, living in Paris, has constructed a little apparatus which, consisting of a metal thermometer, with the help of an electric current, will call attention when the temperature in the vineyard is nearing freezing point.

The alarm consists of a hollow piece of metal, which is filled with amyl-alcohol, commonly known as wood spirit. This tube is similar in construction to the one used in a Bourdon pressure-gauge. A change in temperature acts directly on this tube, inasmuch as it expands when heated and contracts when cooled. This expansion or contraction, as the case may be, is transferred by a metal rod (B in the figure) to a leverage inside the clock-like form of the apparatus, which sets a pointer moving over the thermometric scale.



Now, as every metal thermometer does not act similarly correct, so it is necessary, before relying on the instrument, to compare it with a normal quick-silver thermometer, and to correct the difference by changing the metal rod D.

To the right and to the left of the pointer C there are two movable rods, D and E. Of these two D is moved till it covers xl. degrees C. ($34\frac{1}{2}$ degrees Fahr.) The apparatus is, therefore, so set that it will call when the temperature is 1 degree C. over freezing point. This instrument has been used with great success in many vineyards, and can be thoroughly relied upon. A few notes on its use in practice will be interesting, and, although rather late to obtain one for this year, its efficacy might induce those vignerons who suffer from frost to obtain such an instrument and test it some future season.



At the college in Geisenheim, where careful experiments were carried out with this instrument, they placed the thermometer in the Spalier garden of fruit trees, which were in full flower, in such a manner that the lowest part of the thermometer was $2\frac{1}{2}$ inches from the ground. A copper wire, 125 yards long, kept above the ground by isolators on wooden stakes, connected the thermometer and the room of the watchman, and from there back to the thermometer again. In the watchroom was fixed up a galvanic battery,

consisting of three cells of the Lechanche system, as also an electric bell. The figure will show the connection between the thermometer, the battery and the alarm bell As soon as the pointer C touches the rod D set at xl. degrees C., the electric current is connected, and the alarm bell rings.

This apparatus is also of use to give the alarm when the temperature of a hothouse, drying kiln, or any other place where it is not desirable to go above a fixed temperature, rises too high. The rod E is set, and when it is touched by the pointer C, an electric current is set up, and the bell rings. Of course, the wire must be changed from D to E.

On the night of the 26th of April in Geisenheim, the thermometer on the ground fell to 6·2 degrees C (21 degrees Fahr.), and that placed 3 feet above the ground, to 29 degrees Fahr. This night the apparatus worked to perfection. At 12·45 a.m. the alarm went off, awoke the men, and they went into the garden and carefully watched the quicksilver thermometer placed close to the apparatus. At 1·30 the temperature was 33 degrees Fahr., and at this point they started to light the smoke fires, which consisted of cylinders of tarred turf and peat. There must a considerable quantity of smoke present to prevent the thermometer from falling to 32 degrees Fahr. freezing point. To increase the smoke moist dung was thrown over several of the cylinders, and, besides, they did not burn so quickly.

The temperature in the Spalier garden remained at 33 degrees Fahr., whereas that part where no means of combating the frost were taken, it sank from 29 degrees to 21 degrees Fahr.

On the 19th of May the temperature sank to 26 degrees Fahr. in the low-lying vineyards, and there means again were taken to prevent the temperature falling. As, unfortunately, the supply of peat cylinders had run out, they tried, instead, heaps similar in construction to those described in the August number of *Garden and Field*, and with which they have achieved such success in Austria and France. The vines were not cut by the frost, but those near the heaps were found to be scalded by the steam. We need not fear this here, as our vines are so much further apart, whereas there they are about 3 feet by 3 feet, and even closer. The experiment was not quite so successful, and they give as a reason their inexperience in the use of the smoke fires.

The peat cylinders consist of resin, tar, and peat, and are dipped in crude oil to set the stuff burning. They burn three or four hours each. The clouds of smoke protect the vines from frost; the warmth brings the air into circulation, and so breaks the calm, which generally accompanies a frost.

The price of a Richards's alarm thermometer is 22 francs in France (18s. 4d.), an electric bell about 5s., a battery 10s. to 15s., a precision quicksilver thermometer 10s., the copper wire 5s., or, according to the length required; the isolators about 6d. each; so it would not be a great initial expense if you can save even half-a-crop by the use of the apparatus."

HAIL PREVENTION IN SWITZERLAND.

Some time ago we published an article on hail and hailstorms, in which were described the means adopted in Austria and Upper Italy to prevent the devastation of farms by hailstones. We now learn that the Agricultural Colleges of Switzerland have been provided with similar hail-preventing mortars; so far the use of them has proved successful. Encouraged by the experiments the Swiss Federal Government have granted an endowment of 2,000 francs to the Canton of Ticcino, on condition that the cantonal authorities spend a similar sum in establishing hail-preventing stations. Ticcino is on the southern side of the Alps, and is more exposed to hailstorms than any other part of Switzerland.

Botany.

PLANTS REPUTED POISONOUS TO STOCK.

By F. MANSON BAILEY, F.L.S.,
Colonial Botanist.

GOMPHOCARPUS BRASILIENSIS, Fourn.

By referring to the accompanying plate, which is taken from Martin's "Flora Brasiliensis," it will be seen that this plant bears a close resemblance to the Mediterranean species, *G. fruticosus*, R. Br., which has overrun many places in the southern colonies. When by chance this latter has been introduced into the colony, it has not taken kindly to our climate, preferring a dry rather than a damp summer heat. The Brazilian plant now brought under notice is spreading, and likely to become a nuisance if care is not taken to check its growth. Another reason why it should not be allowed to spread is that the order to which *Gymphocarpus* belongs—namely, Asclepiadeæ—contains many species possessing highly poisonous properties; therefore this species may prove injurious to stock.

Explanation of Plate.

Shoots bearing Flowers and Fruits.

Fig. 2. Expanded flower.
Fig. 5. Corona.
Fig. 6. Leaf of same.
Fig. 9. Pollen-masses.
Fig. 11. Stigma.
Fig. 12. Vertical section of fruit.

CONTRIBUTIONS TO THE FLORA OF NEW GUINEA.

By F. MANSON BAILEY, F.L.S.,
Colonial Botanist.

His Excellency the Lieutenant-Governor of British New Guinea, the Hon. G. R. Le Hunte, C.M.G., recently brought from that island a small collection of plants which he has kindly handed to me for determination. The collection proved very interesting, for, while the species were few in number, the specimens were in an excellent state of preservation, and some of them belonged to unrecorded species. In the following list I have taken the opportunity to include the names of a few specimens received some months ago from Mr. A. Giulianetti, the Government Naturalist of British New Guinea. These are marked with an asterisk.

BIXINEÆ.

Bixa Orellana, *Linn.* Arnotto. A dye-yielding plant, and cultivated for this purpose in many of the islands.

LEGUMINOSÆ.

Afzelia bijuga, *A. Gray.* A timber tree yielding a hard serviceable wood.

Plate XLIV.

GOMPHOCARPUS BRASILIENSIS, Fourn.

Plate

LE HUNTE'S RUBBER-TREE.

Ficus Benjamina, Linn., var. Le Huntei, Bail.

CUCURBITACEÆ.

Trichosanthes papuana, *Bail.* (n sp.) The specimens were in leaf only, but these probably belong to the same plant which bears the red, round fruit, of which there was a half-shell in the collection

Stems deeply sulcate. Leaves 3-foliolate, membranous, oblong-lanceolate; 4 to 5 in long, 2 to 2½ in. broad in the middle, apiculate, often with an oblong obtuse lobe near the base on the outer edge of the lateral leaflets; margins entire. Petioles about 2 in long, petiolules 3 or 4 lines, more or less bordered by the decurrent lamina; lateral nerves distant, reticulate veins prominent. Tendrils 3-branched. No flowers, but the half-shell of a fruit shows it to be, when perfect, globose, 5 in. in diameter, said to be crimson outside, flesh yellow, pulp dark green as in *T. pentaphylla*, F. v. M.

BEGONIACEÆ.

***Begonia fulvo-villosa,** *Warbg.*

ASCLEPIADEÆ.

Hoya australis, *R. Br.*, which has previously been gathered in German New Guinea.

GESNERACEÆ.

Bæa Commersonii, *R. Br.* A small hairy-leaved plant, found on dead coral, Woodlark Island.

BIGNONIACEÆ.

Tecoma australis, *R. Br.* A common Queensland species. This was also sent to me by Mr. W. E. Armit from New Guinea in 1897.

ACANTHACEÆ.

Acanthus ilicifolius, *Linn.* The Holly-leaved Bear's Breech. A showy plant of coastal swamps. Leaves like English holly. Flowers rich blue.

LORANTHACEÆ.

Loranthus, near **L. alyxifolius.** One of the showy flowered so-called mistletoes.

URTICACEÆ.

Ficus Benjamina, *Linn.*, **var. Le Huntei.** "Le Hunte's Rubber-tree." I cannot from the material to hand distinguish this fig from that widely spread species, *Ficus Benjamina*, Linn. The specimens seem to have been obtained also from a plant of drooping habit. The leaves are from 2½ to 3½ in long, the widest part just below the middle being about 1½ in. broad, and from thence tapering to an acute point, base cuneate. Petioles about ½ in. long. Stipules about ½ in. long, narrow lanceolate. The few receptacles preserved show them to be more pyriform and the ribs more prominent than is usual in *F. Benjamina*, 5 lines long, 3½ lines broad; ribs prominent towards the base. Basal bracts 3, orbicular-apiculate, more or less keeled. Internal bracts, numerous filiform. Perianth of 3, ovate shortly stalked segments of a more or less dark purple. Male flowers few, the anther not exceeding the perianth, the cells distinct and parallel. Stigma subulate as in *F. Benjamina.* (Plate XLV.)

ORCHIDEÆ.

Dendrobium. A raceme of flowers, only, seems a form of *D. undulatum*, R. Br. A strong-growing coastal species.

Spathoglottis papuana, *Bail.* A terrestrial species with conical pseudo-bulbs, and long broad leaves. Flowers from deep purple to near white, very showy, and continue blooming for several months.

***Saccolabium Bagnoliana**, *Bail.*

Epiphytal. Stems probably long, flexuose, and angular, 1½ to 2 lines broad appearing wider at the leafy portion from the leafsheaths being much compressed. Leaves linear flat, 3 to 5½ in. long, 6 to 9 lines broad, thin with numerous parallel nerves, the apex unequal-sided and irregularly torn or toothed. Racemes dense, erect, lateral. Peduncle slender, 5 in. long, bearing a raceme of about 2 in. Empty bracts 2, membranous, stem clasping; bracts subtending; flowers filiform, half the length of the pedicels. Pedicel with ovary 4 lines long. Sepals and petals oblong, apiculate, scarcely 2 lines long, the lateral ones as well as the petals adnate to the basal projection of the column. Labellum scarcely as long as the other segments, the middle lobe narrow, incurved. Spur, club-shaped, longer than the pedicels and curved. Column short, wings about half the length of the column, truncate at the lower end. Pollen-masses almost globular.

Hab.: British New Guinea, *A. Giulianetti.* The species is named after Signor Bagnoli, a much-esteemed friend of the discoverer of the plant.

Vanilla Giulianettii, *Bail.*

The specimens marked "Indigenous Vanilla" consist of a few joints of the stem, bearing three leaves, with a few fruits preserved in spirits. From such material it is scarcely safe to name. The plant, however, seems a vanilla, and to be nearly allied to *V. albida*, Blume, so provisionally might bear the name of the discoverer, A. Giulianetti, the Government Naturalist of British New Guinea.

Stems climbing, angular. Leaves sessile, oblong, tapering at both ends, thin (when dry), 10 in. long, 2¼ in. broad, parallel longitudinal nerves close and numerous, about 27. Fruiting raceme stout, about 4 in. long, the lower bracts nearly orbicular; capsule curved, 8 in. long. 10 lines in diameter, smooth, fleshy, the sutures sulcate.

Habenaria graminea, *Lindl.* A terrestrial species, from Morehead River (West).

COMMELYNACEÆ.

* **Aneilema acuminatum**, *R. Br.* One of the Spider Worts, common on wet ground.

NAIADACEÆ

* **Aponogeton crispum**, *Thunb.* An aquatic plant.

GRAMINEÆ.

Andropogon sericeus, *R. Br.* The "Blue grass" of Queensland. An excellent fodder grass.

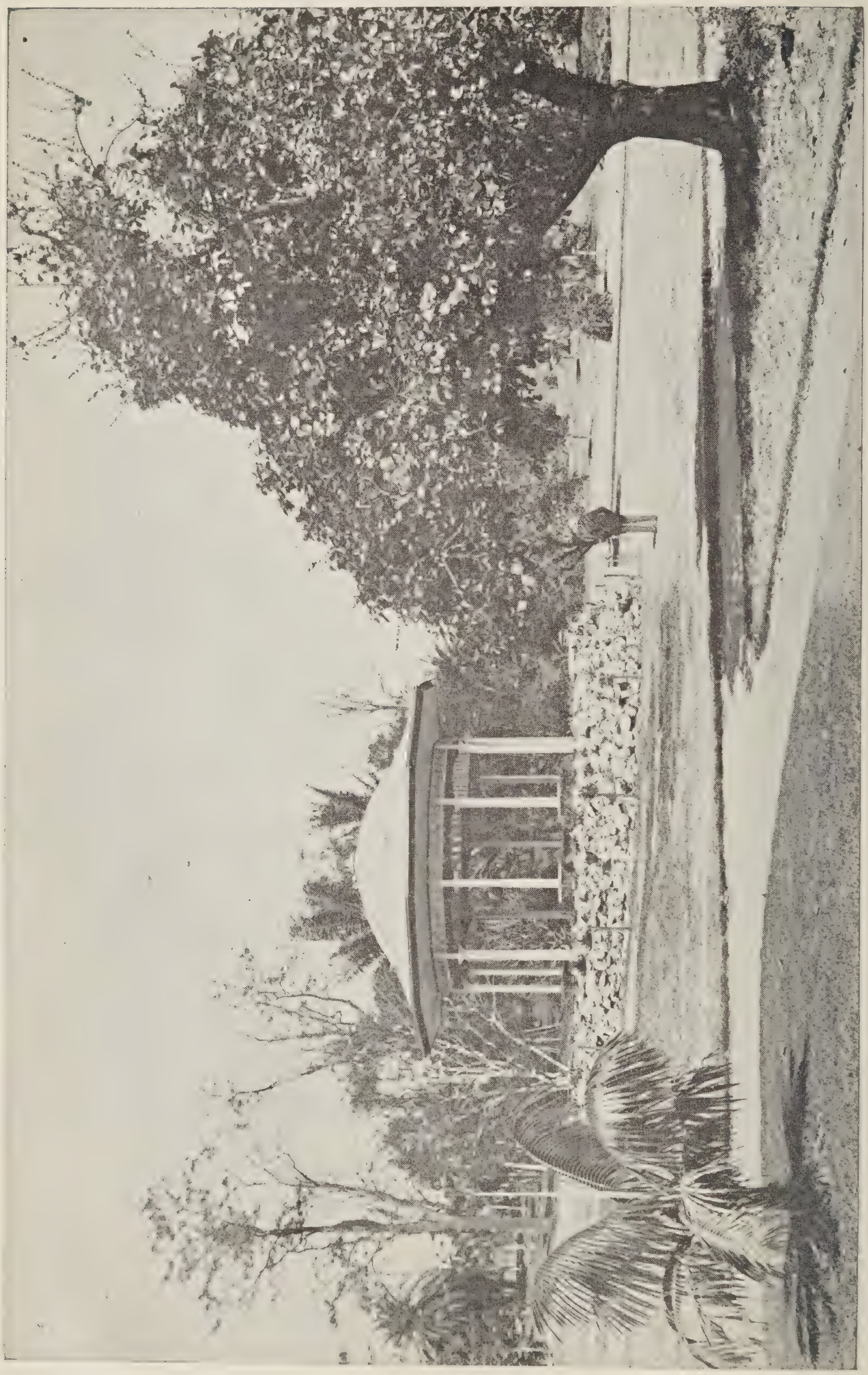
? **Oxytenanthera**, sp. One of the bamboos. The specimens appear to belong to this genus, but the inflorescence is too old and imperfect to correctly determine.

LYCOPODIACEÆ.

Azolla pinnata, *R. Br.* Red "Water-moss." This, with its ally (*A. rubra*), often covers the surface of ponds.

FILICES.

Lygodium dichotomum, *Sw.* A beautiful climbing fern.



THE NEW BAND STAND, BRISBANE BOTANIC GARDENS.

Open Spaces for the People.

By PHILIP MAC MAHON,
Curator of the Brisbane Botanic Gardens.

If you lay a map of Brisbane on a table side by side with the maps of other cities, one point of difference will strike you. The other cities are interspersed freely with large open spaces. Brisbane is mainly a network of roads and streets. It would be difficult to convince a stranger with these maps before him that this plan of Brisbane represents a city which is the capital of a country having an area of considerably over half-a-million square miles, with about one person to every square mile. A young, new, vigorous country, with all the mistakes of all the bygone centuries to learn from. A country in which shade trees grow for the planting, and need not the expensive care so necessary in cities where they are so largely grown. A country, too, where every breath of air and every inch of shade is craved by those who seek the open air, and where confinement indoors means sure physical deterioration. A country, the excellence of whose vegetable products is its boast, and whose climate invites to an outdoor life. Such is the country whose capital presents no more alluring features than lines of fences, to venture beyond which is to commit an act of trespass.

The Botanic Gardens, even with the Government Domain added, form a mere patch of green upon the map, compared with the miles of streets which reticulate from Stafford to Coorparoo, and from Toombul to Indooroopilly. The one green spot of any size is Victoria Park. This lung is just a piece of waste land, to all appearance. It has been used for burying the refuse of the city in. It contains no trees of shade-giving proportions, and a ramble through it on a scorching day is not a memory to be treasured. It is open at night, but the inhabitants of the densely populated districts of Spring Hill, Red Hill, Kelvin Grove, and Fortitude Valley immediately at hand show no great disposition to use it for promenading purposes on moonlight evenings. Albert Park and Wickham Terrace Reserve are both rather pretty places. Both are badly provided with seats, and, viewed from an English or Continental standpoint, can hardly be termed parks. These reserves are closed at sundown.

A great deal has been said from time to time as to the facilities which exist in other countries for promenades in the evening by moonlight or electric light, and, certainly, no climate in the world lends itself to such a healthful and rational form of recreation as ours. Such a promenade is a most desirable thing, but the throwing open in a promiscuous way of any or all the gardens of the people, more or less cared for, is not the way to provide it. The only result of such an ill-judged course of action would be to provide a few more places of the type of the Woolloongabba Reserve.

What Brisbane wants is a promenade after the fashion of the English or Continental Spas, of not too large an extent, brilliantly lighted, with a good pavement in first-class order, interspersed with small groups of trees and flower-beds, well protected, for most of the damage done at such places is unconscious. A good band would be a necessity, for without it the attendance would soon die away. The seating accommodation should be ample. Refreshments of a good sort should be procurable at a rate which would not be excessive. There should be always sufficient attendants or police to ensure respectable conduct, and above all there should be by-laws of such a nature as would enable those in authority to crush any attempts at larrikinism, and to insure civility and good conduct. It would be a place where all citizens might meet on an equality leavened with politeness. Tall palms would wave overhead, the sparkling river would gleam in the soft moonlight in the foreground, and the thousand charms of our semi-tropical evenings enhanced by strains of dreamy music, and enlivened by the gay laughter of happy lads and lasses, would brace many a weary one for the morrow's toil, and make him bless the names of those who gave him these things.

What are our neighbours doing in these directions? Take up the map of Sydney. With the harbour and its hundred indentations, one would fancy that the city had lungs enough, but great patches of green show up all over. You cannot get away from a park. Starting from the north-west you have Five Dock Park, Ashfield Park, Leichhardt Park, Petersham Park, Eastons Park, Camperdown Park, Birch Grove Park, University Reserve, and Victoria Park; Macdonaldtown Park, Wentworth Park, Prince Alfred Park, Belmore Park, Hyde Park, Botanic Gardens, Domain, Moore Park, and Centennial Park (a magnificent stretch of well-kept land); Rushcutter Bay Park, Randwick Park, Waverley Park, Bronte Park, and Bondi Park, besides numerous smaller lungs. On a visit to Sydney made four years ago I inspected all these parks, and was struck with the amount of care bestowed on most of them.

In Melbourne nearly one-half the map is taken up with gardens, parks, and open spaces. Quite close to the most congested district are the Fitzroy Gardens, the Treasury Gardens, the Exhibition Gardens, full of choice plants of all sorts, the Flagstaff Gardens. Then to the south come the magnificent Botanic Gardens, with their carefully tended stores of floral treasures, splendid band stand and Sunday band, Yarra Park, and the Friendly Societies' Gardens. Further south Albert Park, stretching from near the Botanic Gardens to St. Kilda. To the north-west is the Royal Park, with its fine Zoological Gardens, and close by is Prince's Park. To the north-east stretches Studley Park, with a beautifully diversified surface of large area, and south of this is Richmond Park. A regular chain of great open spaces available for the public recreation, and most possessing some features to induce the public to visit them, and so come away improved in body and mind and of more value to the State at large.

Adelaide is girt by a chain of noble parks, known as the Park Lands, and having an area of about 1,900 acres. Its Botanic Gardens, also, are the boast of the whole colony.

Murky London is, perhaps, the last place in which one would expect to see the money of the taxpayer expended in the so-called sentimentalism of pleasure grounds. Yet London has some of the finest parks in the world, and pays for them right royally. Many a stubborn battle has been fought between those who wished to turn the parks to what they considered more appropriate purposes and the people who wanted them to be free to themselves and their descendants for ever. It is related, for instance, that Queen Adelaide, wife of George II., wished to enclose St. James's Park as a palace garden, and asked Walpole what it would cost. "Only three crowns, your Majesty," replied the astute Minister.

Under the control of the London County Council there are 17 parks, 33 gardens, and 37 open spaces. The estimate for the maintenance alone of these for 1899-1900 was £114,515. The parks, &c., are managed by a committee, who have power to expend any sum up to £50 without a vote of the council. All the parks are under an officer called the Chief Officer of Parks, who is responsible to the committee and to the County Council. All the parks of London are not under the council, but some of the most beautiful are. A plan of Battersea Park is shown on another page. The beautifully curved drives and rides will be noted as well as the walks, which, while avoiding angularities, yet give ready access to all parts. Every convenience is provided for. It was laid out originally on reclaimed marsh, quite flat, but by the art of the landscape gardener has been rendered a most charmingly picturesque spot. There are two miles of drive, and, as will be seen from the plan, a horse ride around the entire park. Three refreshment-rooms are provided. The area is 198 acres, 20 acres of which is lake. Its original cost was £313,000, and its staff consists of resident superintendent, 94 men, and 3 women. Its yearly cost is £10,315.

In addition to the parks mentioned above as being under the London County Council, there are the Royal parks, which include Hyde Park, 363 acres; Green

Plate XLVI.

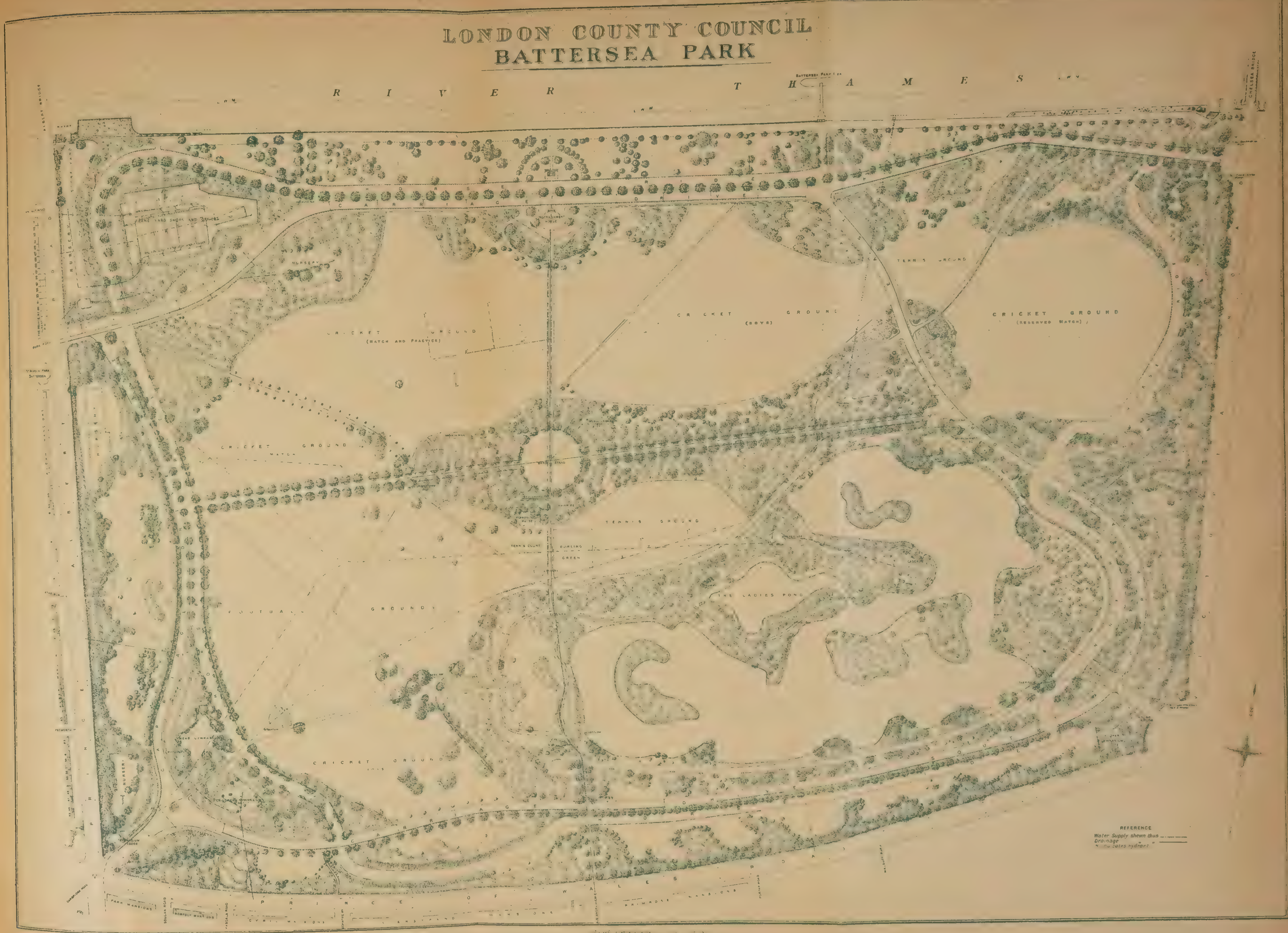

LONDON COUNTY COUNCIL
BATTERSEA PARK
RIVER THAMES
CARRIAGE DRIVE
CRICKET GROUND (MATCH AND PRACTICE)
CRICKET GROUND (BOYS)
CRICKET GROUND (RESERVED MATCH)
TENNIS GROUND
CRICKET MATCH GROUND
TENNIS GROUND
FOOTBALL GROUND
THE LADIES POND
CRICKET GROUND
PRINCE OF WALES ROAD
REFERENCE
Water Supply shewn thus
Drainage

Plate XLVII.


PLAN
OF THE
BOTANIC GARDENS
AND THE
GOVERNMENT DOMAIN.
BRISBANE.
SHORT ST.
WILLIAM ST.
GEORGE ST.
ALICE STREET.
ALBERT ST.
EDWARD ST.
BRISBANE RIVER

Park, 52 acres; St James's Park, 93 acres; Regent's Park, 427 acres; Kensington Gardens, 274 acres; Greenwich Park, 185 acres. The Royal parks, including Kew Gardens, cost about £150,000 per annum out of the general revenue.

In addition to the above two classes there is yet another large class, about 117 places, kept open by local vestries. These vary in extent from 30 acres to as many square yards. In several places the local vestry supplies a weekly band, this being looked upon from an educational point of view. It may be mentioned that the London County Council employs four first-class bands regularly to play in their parks, besides other bands frequently.

There is in England an association for the preservation of open spaces. The chairman is the Earl of Meath. I have not the figures by me of the number of places which this association has been instrumental in throwing open to the public, but the record is a marvellous one, and I will give it to the readers of the *Journal* at a later date. The association employs a very clever landscape gardener, who is a lady. Directly there is a prospect of any piece of land, if there is only room to put a seat upon it, being handed over to the public, this association takes the matter in hand and the land is fixed as the property of the people for all time.

Wimbledon and Putney Commons are under a special Act of Parliament. They comprise 1,200 acres, and £4,5 0 per annum is required to pay for their keep. This is provided by a tax levied on householders within a certain distance of the commons, who have to contribute also, as ratepayers, towards the keep of the other London parks, and towards the maintenance of the Royal parks, as general taxpayers.

Paris is regarded throughout the world as the city of gardens, but the city proper has a far less proportion of parks than has London. The magnificent Boulevards, the shade trees everywhere to be met, and the out-of-door life of the people combine to give a garden-like appearance to the beautiful city. The gardens of the Tuilleries, situate in the heart of Paris, comprise 74 acres—a little smaller than the Brisbane Botanic Gardens and Government Domain. They are, of course, beautifully laid out, and planted with chestnuts, lindens, and other beautiful shade trees, and adorned with fountains and statuary. The Luxembourg Gardens, of larger size, have fine conservatories, and are utilised as a school of technical gardening. The Buttes-Chaumont Gardens, of 62 acres, are, from an English standpoint, the most picturesque, being undulating and more park like than the other gardens in the formal French style. In the recent improvements of Paris much ground of great value for building purposes has been devoted to the formation of public squares, which have been planted, and are most religiously tended and preserved at the public expense. The Jardin des Plantes is an educational institution as well as a promenade. It occupies 75 acres; has hothouses, nurseries, museums, laboratories; and lectures by men of eminence in the various branches of natural science are given daily.

But Paris, failing to find lands within the city, has established a magnificent park to the west, beyond the fortifications. The Bois de Boulogne covers 2,158 acres, and everything which the art of man, aided by trees, flowers, running water, green turf, and beautiful views, can do, has been done to make this the paradise of the Parisian.

The Bois de Vincennes lies to the south-east, about the same size as the Bois de Boulogne, or perhaps slightly larger. All these parks form part of a system. The nurseries at the Bois de Boulogne and Auteuil furnish plants for all. The municipality has Botanic Gardens, also those of La Muette with about 4 acres under glass, where all plants used for decorating on public occasions are grown.

Vienna possesses one of the finest parks in the world—the Prater, about 2,000 acres in extent, and most largely frequented by all classes of the pleasure-loving people. The Hof-garten, Volks-garten, and Town Park are also of fair extent, well managed, and largely frequented. These lie almost in the centre of the city.

If land is of value anywhere in the word it is in the city of New York. A glance at the map will show, however, that the very centre of the city is taken up by a park $2\frac{1}{2}$ miles long by $\frac{1}{2}$ mile wide. No fewer than 112 streets open on to this splendid park of 843 acres. It was laid out only forty-two years ago, and a careful study of the detailed plan before me shows it to be a consummate work of art, carried out altogether regardless of expense.

Other parks of New York, of which there are about thirty, are smaller, varying from 20 acres in Mount Morris Square to less than an acre. They are all beautifully kept.

It would be possible to multiply instances without end of the care which has been taken in other places to secure open spaces for the public enjoyment, and to maintain them as befits the joint pleasure grounds of the people, both of the classes and the masses. As time goes on, the preservation of open spaces will become a work of increasing difficulty. Land easily enough to set apart now will not be obtainable, except at great inconvenience and expense later on. The necessities of our climate, the increasing tendencies of our people to outdoor recreations, and the experience of older States demand that this matter should have the watchful attention of those who guide the destinies of our cities and our States.

SAUERKRAUT.

Amongst many vegetables which are allowed to go to waste in large quantities in our gardens and fields are cabbages. Scores of fine cabbages are left to rot every season when they might, by intelligent, progressive cultivation, be turned into the excellent but, by Queenslanders, ill-appreciated food—sauerkraut. This preparation of the cabbage is not appreciated in the colony by Britishers, because they probably have never tasted well-made sauerkraut. Be that as it may, we present to our readers a recipe for its manufacture, given by Mr. G. H. Murphy, Vice-Consul at Magdeburg, Germany. He says:—

The best German sauerkraut is made in Magdeburg; but when a consular officer attempts to ascertain how it is made, he encounters the usual insuperable obstacle—business secrets. The manufacturer politely replies to all inquiries: "My recipe is what makes my business profitable. If I gave it to you, you could make the same sauerkraut in Washington. The fame of Magdeburg would thus be dimmed, and what would become of the orders which mean so much to me?"

The process of manufacture, omitting business secrets, is about as follows:—

Take a number of heads of white cabbage, as fresh as possible, and cut them into fine, long shreds. Place in layers in barrels, or kegs, strewing salt over each layer, using $\frac{1}{2}$-lb. of salt for each twenty-five cabbages. Press the mass down with clean feet, wooden shoes, or a heavy stamper. Place a cover on the barrel, and upon this lay a heavy stone. This presses the sauerkraut more and conserves it better. The sauerkraut must then be allowed to ferment in a cellar for from three to eight days, according to the temperature of the room. The barrel should then be tightly closed and kept in a cool place, preferably in a cellar.

After the barrel is closed the sauerkraut will be ready for use in about a week. As soon as some is used, the barrel should be covered, and a stone again placed on top.

In preparing and keeping sauerkraut, sunshine and extremes of heat and cold should be avoided.

Horticulture.

HOW TO TEST VITALITY OF GARDEN SEEDS.

By T. S. HITCHCOCK,
Experiment Station, Manhattan, Kansas.

It is well known that the vitality of seed diminishes rapidly with age. Dealers sometimes keep seed over from one season to another, and, if the vitality is too low, may mix fresh seed with this. Low vitality may not be due to age, but to unfavourable conditions at the time of harvesting or to immaturity. In any case, it is well to determine the vitality before planting. While it requires some experience to determine the impurities in seeds, the farmer can at least test his seed for vitality.

A cheap and convenient form of apparatus for testing the vitality of seeds at home is the following:—Choose two earthenware plates of the same size. Cut out two circular layers of flannel, somewhat smaller than the plates. Between the two layers of flannel place 100 seeds of the variety to be tested. Moisten the flannel with all the water it will absorb. The two layers of flannels are placed in one plate and covered with the other, and set in a warm place. If the flannel is thin, several pieces should be used in order to absorb sufficient water. Other kinds of absorbent cloth or blotting-paper can be used, but thick flannel is rather more satisfactory. At the Kansas Experiment Station we have used damp sand for a seedbed with good success.

The dishes should be placed in a room which is kept warm at night. The flannel should be kept moist by the addition of more water when necessary. Some seeds will commence to germinate by the third day. Each day an examination should be made, and those seeds which have germinated should be recorded and removed. For practical purposes two weeks is a sufficient time for the test. The results obtained may be considered as representing the per cent. of vitality under favourable conditions. The per cent. germinating in the ground is likely to be less. In counting out the 100 seeds care should be taken to discard the seeds of weeds or other plants which may be present.

Grass seeds require as much as three weeks, and seeds of some trees a still longer time. Beet balls contain from three to seven seeds. With very small seed it may be necessary to provide for the circulation of air by placing small pieces of wood between the layers of cloth among the seeds. With most varieties of garden plants the majority of seeds should germinate within a few days after the first sprout appears. If the period of germination extends over a longer time, it shows that the vitality of the seed is low. Seeds of the carrot family and some melon seeds may not show as high results in the germinating dishes as they do in the ground.

Below is given a list of common seeds, with the average number of years that they will retain their vitality (taken from Professor Bailey's Horticulturists' Rule Book): Bean, 3; beet, 6; cabbage, 5; carrot, 5; celery, 8; cucumber, 10; Indian corn, 2; lettuce, 5; musk melon, 5; onion, 2; parsnip, 2; pea, 2; pumpkin, 4; radish, 5; summer squash, 6; tomato, 4; turnip, 5; watermelon, 6.

Sericulture.

SERICULTURE IN FRANCE.

The following is extracted from a report by the United States Consul at St. Etienne on sericulture in France:—

As is well known, the mulberry-tree presents several varieties, the most important of which are the black, the white, and the variegated, and of these the second variety is preferred in France, as it develops without much care and can be easily cultivated either from the seed of the plant or by grafting. It reaches maturity more quickly than the black species, and the silkworms take to it more kindly. A mulberry-tree, at five years of age, furnishes, in France, 72 lb. of leaves; at ten years, 104 lb.; and at twenty-two years, 200 lb. The practice is to strip the leaves once in every two years, as it has been noticed that the tree lives much longer than when deprived of its leaves annually. Besides this, the leaves acquire greater firmness and brilliancy. As to the climate, the most favourable to the cultivation of the mulberry-tree is that which suits the vine.

The eggs are hatched artificially, by means of incubators, because if allowed to proceed naturally the caterpillars would be produced at unequal and long intervals. The temperature of the incubator is allowed to rise gradually from 54 degrees to 74 degrees Fahr., thus imitating the process of nature.

Incubation lasts from 20 to 30 days. Before provoking the artificial hatching of the eggs, the custom in the south of France is to place them in a cold room, where the temperature varies between 37 degrees and 50 degrees Fahr., during the five months of winter. Formerly the cultivator who reared silkworms selected, from his finest cocoons, the quantity of eggs necessary for the following season; 20 lb. of cocoons furnished 15 oz. of eggs. In the year 1847 a terrible malady ravaged the French rearing-houses; the worms, instead of developing progressively, both in volume and energy, languished, became covered with black spots, and finally perished. This disease, called pébrine, which is hereditary, epidemic, and contagious, increased with such intensity that the eggs had to be imported from Italy to continue the industry. It was not long, however, before the Italian eggs were attacked in their turn, with the result, for France, that whereas 25,000,000 cocoons were produced in 1853, the amount had fallen to 5,000,000 in 1865. For several years the eggs were obtained from the provinces of the Danube and from China, but the production was unsatisfactory, and they became more or less contaminated after their arrival in France.

At this critical period (1865) in the history of the French silk industry it was discovered that the Japanese eggs resisted the disease (pébrine), and large quantities were imported for several years, or up to the time when Pasteur showed that the only remedy for the malady consisted in the selection and isolation of the apparently healthy moths and in the microscopic examination of the eggs and the dead insect. This system has been followed ever since. A part of the moth, or some of the eggs, is rubbed up in a little distilled water, and a drop of the mixture put under the microscope; if pébrine be present, a quantity of small corpuscles is seen on the plate, indicating the nature of the malady. It was owing to this system that the production of the silkworm in France revived. Of late years not only has the country been able to supply itself, but it now exports over 300,000 oz. of silkworm eggs annually.

About 1,600 lb. of leaves are necessary for 35,000 silkworms produced from 1 oz. of eggs. The "education" lasts from twenty-eight to thirty-two days, but many silkworm-raisers cut this period short two or three days by maintaining an increased temperature of between 68 degrees and 77 degrees Fahr.

The maximum amount of cocoons which 1 oz. of eggs, comprising 35,000 worms, furnishes, is 130 lb , but a return of 80 lb., is considered very satisfactory. From 625 to 1,100 cocoons are required to make 1 lb. of silk, and the price of 1 lb. of cocoons in St. Etienne is 1·75 francs (1s. 5d.). The total amount of cocoons produced annually in France is about 20,000,000 lb.

The cocoons selected for reproducing purposes are strung together like beads, and placed in a dark room, where the temperature is kept at 68 degrees Fahr. At the end of eighteen or twenty days the moths appear, but frequently in France the cocoons are kept the whole winter in a cellar at 50 degrees Fahr. before being exposed to the higher temperature. The moths are allowed to couple for from six to eight hours, and then the females are removed and enclosed in little sacks made of gauze, called cellules, where they lay their eggs and die. Later on, the dead insects are examined under a microscope, as has been already mentioned, to discover any traces of pébrine.

As soon as the cocoons arrive at the factory, where they are to undergo the reeling process, they are exposed to a steam bath in an oven, in order to asphyxiate the chrysalids and thus prevent piercing the cocoons. After this operation the cocoons are taken to the drying-room, where they remain three months. Another method much more rapid is that of the hot-air drying process. Exposed to a temperature of 140 degrees Fahr. for twelve hours, the cocoons become dry enough to be immediately packed. There is still another system, which is a combination of the two already mentioned; that is to say, steam is first applied to kill the chrysalids, and a current of hot air is turned on to complete the necessary desiccation.

When the cocoons are brought to the reeling factory, a girl, or "fileuse," sits before a large basin made of copper or iron, coated with enamel, and filled with water; she throws them into the water, which she brings rapidly to a high temperature by means of a steam tap. Then, by the aid of a little broom, made of briar twigs, called an "escorbette," she strikes the cocoons lightly. By this little operation the outside coverings, which are considered an inferior product, are removed. This floss silk, called "frisons," is collected in the form of cords, and plunged into cold water to harden the glutinous substance. The proportion of "frisons" is from 25 to 30 per cent. They are taken out of the water twice a day and dried. Preference is given to the "frisons" coming from the spinning mills where the work is done at the highest temperature.

When the girl has sufficiently beaten the cocoons, she detaches from the broom the number of threads sticking to it, and, seizing them in her left hand, proceeds with her right to remove the loose silk (débarage). This operation consists in drawing out each thread of silk until it is perfectly from "frisons." She then fixes the thread to a hook on the basin, and commences to reel.

Of late years this manual labour has been, in the more important spinning mills, supplanted by ingeniously devised machinery, invented by MM. Berthaud and Fils, of Lyons, reeling from four to six threads at a time.

Taking the loose silk of several cocoons according to the size required, the fileuse joins them and passes them through the drawplate (filière), and thus prepares two threads, which she crosses by twisting one around the other a great number of times—from 200 to 300. She separates them again, passing them through a ring on each side of a bar, and after crossing them once more she attaches them to the wheel, which she turns either by foot or by hand, and the unrolling of the cocoons commences. The wheel is usually of large dimensions, from 39 to 50 inches in circumference, though many smaller ones are used.

Once the wheel is put in motion, the operator keeps her eyes on the cocoons and on the thermometer, for the water must be kept constantly at 158 degrees Fahr. For a long time, when the thread broke while winding, the attendant simply continued her work by passing the distal end on the wheel, but now the custom is to tie both ends in a form of knot. Special girls, called "noueuses" or knotters, are told off for this purpose.

The method of folding the silk when taken off the wheel varies according to the country. In France, the custom is to make skeins by folding it into two and twisting one side over the other, and then making it up into bales, when it is ready for the next operation, called "moulinage" or silk-twisting.

The silk in the raw state is not twisted; it forms simply a bundle of threads glued together, and cannot be employed as such. To prepare it for the dye it is twisted, by which its degree of resistance is increased, while its elasticity is diminished, and when the operation is completed it takes the name of "organsin." In the mill, the silk undergoes a double process of reeling and cleaning before being finally twisted and made up in hanks and skeins for the market.

Before the buyer will accept delivery of the silk he requires it to pass through the condition-house (that of St. Etienne is very important), in order to estimate its true weight, as it is easy to increase the weight of silk by damping it with water by reason of its great hygrometric properties. However, it has been proved, after long and minute observation, that the silk contains normally 10 per cent. of humidity, and the work of the condition-house is to reduce any excess over that standard. To effect this object, the weight of the silk rendered absolutely anhydrous is first determined, and then a quantum of humidity, which by agreement has been fixed at 11 per cent., is added. Up to 1839 the process of desiccation consisted in exposing all the silk on shelves of iron grating for twenty-four hours in a room heated to 84 degrees Fahr. If the silk lost from 3 per cent. to 4 per cent., the operation had to be recommenced. The results offered no security, and were frequently contested. The Chamber of Commerce of Lyons improved the method, and it is due to the Talabot apparatus by which, for the first time (1839), absolute desiccation was obtained. In this apparatus the silk was exposed for three hours to a temperature of 221 degrees Fahr., obtained by a current of steam. In 1852, M. Persoz perfected this method by a current of very hot air acting simultaneously by its rapidity and its high temperature. This last apparatus has been used ever since in all the condition houses throughout the country, under the name of "The Talabot-Persoz-Rogeat Desiccator," and has the appearance of a cylinder of sheet iron 29½ inches in height and 16 inches in diameter.

After weighing the bale, three samples of 500 grams (1·1 lb.) each are chosen—one from the top, one from the middle, and the third from the bottom of the bale. These three lots represent the hygrometric condition of the bale, and serve as a basis for the condition test. Two of them are first placed in a receptacle, where the silk loses a portion of its humidity, and are then carried to the Persoz apparatus. Here the silk is suspended on the arm of an extremely sensitive balance (known weights being on the other arm) forming part of the machine, and covered hermetically. The silk, submitted to the action of the current of hot air, remains in position until the balance shows by its immobility that there is no longer any decrease in weight. The two lots of 500 grams are thus absolutely dried, and a calculation is made of the difference between the actual and the primary weights. If the hygrometric condition showed a difference of more than 1½ per cent. of one lot, as compared with the other, the third lot must undergo the same process. Finally, the absolute weight of the bale is calculated in proportion to the weights found for the samples. The duration of the test does not exceed 45 minutes, the temperature of the interior of the apparatus being kept at 248 degrees Fahr.

The quantity of silk passing annually through the condition-house at St. Etienne exceeds 1,000,000 lb.

After passing through the condition-house, the silk is submitted to another operation called "titrage," in order to determine its quality. For this purpose a certain number of skeins of silks, of a given weight and length, are placed upon a little wheel and pass thence to a yard windle, which measures exactly

1·25 metre (49·21 inches) in circumference, revolving around a horizontal axis. This axis is furnished with a cog wheel controlling a series of others, which, in their turn, put in motion the needle of an indicator; when the needle has executed a complete revolution, corresponding to 400 turns of the windle, a catch stops the machine instantaneously and throws the windle out of gear. The skein obtained, which measures exactly 500 metres (546·8 yards) in length, is weighed in a proved balance.

The third and last testing operation is that of "décreusage" or ungumming. This is effected by boiling a small sample of the silk for one hour in a bath of distilled water, containing one-fourth of its weight of white soap. After the first half-hour the silk is taken out and well wrung, and then put back again for another half-hour of boiling, after which it is thoroughly washed in a current of cold water to remove all particles of soap that may have remained. As this operation produces a loss of weight amounting to 25 per cent., the buyer calculates his price accordingly.

Under the heading of waste are comprised: the cocoons spotted or pierced, the first coverings of the cocoons ("frisons"), the heart of the cocoon, which, on account of its extreme tenderness, cannot be unravelled, and the defective portions of the raw silk removed during the moulinage and waste resulting from the different operations of winding, warping, and weaving. Nothing is lost. The products are classed under two great heads—schappes and fantaisies. The material is not carded, but combed, like flax, and finally made up into skeins. The annual consumption of floss silk in France is over 4,000,000 lb.

A VALUABLE FRUIT.

Ripe, uncooked apples are among the most valuable of our fruits. It has been said that any man who can and will eat two good-sized apples in the course of every twenty-four hours will never have gout, and, if this destroyer of comfort has already fastened its fangs in his system, apples will vanquish even the most persistent form of this legacy of luxurious living (writes Mrs. N. S. Stowell). Raw apples are much to be preferred for health reasons to those that are cooked. Heat makes chemical changes and destroys or devitalises an acid that seems to act directly on the lime, salts, and earthy matter created in the system by gouty and rheumatic conditions. As a next alternative, baked apples are commended. Baked apple pudding, made with graham flour, sifted, is excellent and healthful. Baked sweet apples and cream are a dish fit for a king. Sour apples are good if not too acid. They sometimes sour the cream, in which case they may cause distress, especially if eaten by delicate children. Bread and milk, or well-cooked johnnycake and milk, with sweet or mildly tart apples cut in pieces like dice, are a popular supper dish in many households. As a substitute for butter, apple sauce and marmalades of various sorts may be used to great advantage, and, if furnished in sufficient variety, children soon come to like them much better. Of dried and evaporated apples it may be said that they are merely substitutes for fresh fruit, which should be put up in cans. Much of the delicacy and flavour of apples is allowed to evaporate with the moisture. Those put up in cans are much more satisfactory in every way. Good, ripe apples and their products in sauces and the like may be eaten at almost any time, with great benefit, save by the few, who, by reason of some constitutional peculiarity, find them unwholesome.—*Pacific Rural Press.*

Tropical Industries.

RICE IN QUEENSLAND.

The Registrar-General's Report on Agriculture during 1899-1900 records that the cultivation of rice is considerably less for the past year, both in area and quantity, than that for the preceding year. It may be remembered that the returns of 1898 for this crop gave great promise of an expanding industry, the area being nearly double, and the yield nearly three times that of the previous year. For some reason, however, both area and produce are much less during the past year, being only 319 acres, against 863 acres for 1898; whilst the yield was 9,275 bushels of paddy, against 38,133 bushels for 1898. The yield per acre, too, had fallen in 1899 to 29·08 bushels, from 44·19 bushels in 1898.

As much of the rice grown in the Northern districts was produced by Chinese, and as the latter, finding other crops to pay them better, sowed these instead of rice, the lessened area may thus be accounted for. Still, as soon as federation becomes an accomplished fact, it is probable that rice will prove a remunerative crop to grow for export to the neighbouring States, as these all import large quantities of rice from Java, India, and other places, not only for food but also for making spirits.

We quite agree with the further remarks of the Registrar-General that it will be a matter of great regret if the cultivation of this cereal is allowed to fall out of the list of Queensland products, since there are so many things to assist the farmer in competing with the imported article. Freight, insurance, shipping and agency charges, besides a duty representing about one-half the cost of the grain itself, constitute together a large protection to the local grower, whilst the demand is far beyond the possible production of years to come.

Foreign growers have good soils and suitable climates, but the soils and climates of the Queensland rice-growing districts are equally favourable. Certainly Japan, China, the Philippines, India, Siam, and Egypt have the enormous advantage of very cheap labour, as will be seen by a reference to the wages table in an article on rice culture in the United States, which we reprint from the *Bulletin* of the Botanical Department of Jamaica.

In those countries swamp rice is grown, a crop that for years to come perhaps never will be looked at by Queensland growers, mainly for the reason that extensive irrigation works are required for the purpose, and no such works are at present available, nor would it appear that they are likely to be inaugurated at an early date. The Queenslander, then, must grow hill rice, and this variety offers him a choice of many suitable areas both in the Southern, Central, and Northern districts. That the grain succeeds admirably in the South has been shown by the enterprise of the Logan farmers, who are busy extending their 18 acres under rice last year, and who have just imported and erected an up-to-date rice mill.

By importing the best seed, in the selection and importation of which the Department of Agriculture is always ready to assist, by careful cultivation, threshing, cleaning, grading, and polishing, there is no reason why rice should not prove a paying crop from one end of the colony to the other. Once get a good name for Queensland rice in the other States, and a demand would spring up for it, resulting in thousands instead of hundreds of acres being devoted to its cultivation.

RICE CULTURE IN THE UNITED STATES.

Although, as we have written in another place, the cultivation of rice in this colony decreased to a large extent last year, yet there is every reason to believe that rice will yet be largely exported from Queensland. It required many years and much experimenting before sugar-growing became an established industry, and one of the most important in the colony. Fortunately for the pioneers of that industry, the use of horse-mills and small steam plants, in conjunction with open pan boiling and striking directly from the "tâche" into the coolers, the absence of vacuum pans, and other conditions which resulted in the small returns for a maximum cost of production were counterbalanced by the high price of sugar at the time of the introduction of the sugar-cane as a field crop and equally fortunately, although many of the original planters went to the wall, yet a high price was maintained until improved machinery and scientific methods enabled the industry to make headway when prices began to fall, and to-day a better profit is made with sugar at £8 10s. per ton than was made when the usual price was from £30 to £35 per ton.

In the same way, the cultivation of rice, now in its infancy, will doubtless expand in the near future.

It will hence be of interest to ricegrowers to read the following paper on rice culture in the United States by Mr. S. A. Knapp, in Bulletin No. 22 of the United States Department of Agriculture, Division of Botany. Certainly the paper deals wholly with swamp or irrigated rice, whilst here the hill rice is exclusively grown. Still, there are points in the article which make it well worthy of perusal by ricegrowers. We omit the introductory paragraphs, which are mainly of local interest:—

GENERAL NOTES ON CULTURE AND TREATMENT OF RICE.

PREPARING THE GROUND.

Some planters advocate shallow ploughing for rice because it appears to thrive best in compact earth. Even if it be granted that the rice plant finds a more favourable condition in compact earth, it does not prove the superiority of shallow over deep ploughing. It has been demonstrated that the better the soil and the more thoroughly it is pulverised the better the crop. The roots of annual cultivated plants do not feed much below the plough line, so that it becomes evident that deep cultivation places more food within the reach of the pulverising the earth deeply be a disadvantage, by reason of the too great porosity of the soil at seeding time, it can be easily remedied by the use of a heavy roller subsequently. If the soil is well drained, deep ploughing will be found profitable. Deep ploughing just before planting sometimes brings too much alkali to the surface. The remedy for this is to plough a little deeper than the previous ploughing just after harvest; the alkali will then be washed out before the spring ploughing. The plough should be followed in a short time by the disc harrow and then by the smoothing harrow. If the land is allowed to remain in the furrow for any considerable time it will bake, and cannot be brought into that fine tilth so necessary to the best seed conditions. This is particularly true of rice land. If the best results are desired, it will be advisable to follow the harrow with a heavy roller. The roller will crush the lumps, make the soil more compact, and conserve the moisture for germinating the grain, rendering it unnecessary to flood for "sprouting."

SOWING.

Selecting the Seed.—Too great care cannot be exercised in selecting rice for seed. It is indispensable that the seed should be free from red rice, uniform in quality and size of kernel, well filled, flinty, free from sun cracks, and free from all foreign seeds. Uniformity of kernel is more essential in rice than in other cereals, because of the polishing process.

Drilling.—The rice should be planted with a drill. It will be more equally distributed, and the quantity used to the acre will be exact. The seeds will be planted at a uniform depth, and the earth packed over them by the roller. It also prevents the birds from taking the seeds. The roller should precede the drill. If it follows the drill, the feet of the horses, mules, or oxen drawing the roller will press some of the planted rice 4 or 5 inches deeper into the earth than the general average. Furthermore, the lumps of earth will prevent the uniform operation of the drill. In rice-farming too much emphasis cannot be placed upon the importance of thoroughly pulverising the soil to a considerable depth; levelling with a harrow as perfectly as possible; crushing all the lumps and packing the surface to conserve the moisture, and planting the seed at a uniform depth.

Broadcast Sowing.—Broadcast sowing of rice should be discontinued; the seed is never scattered with uniformity; some grains remain upon the surface, and the remainder is buried by the harrow and the tramp of the team to depths varying from 1 to 6 inches. Rice sown broadcast does not germinate with any uniformity. Some seeds are taken by the birds, some are too near the surface and lack moisture to germinate, while others are buried too deep. In some instances the variation in the germination of the rice in the same field has been as much as eight weeks. Then at the harvest, when the main portion is ready for the reaper, quite an amount of the rice is still immature. The product commands a very low price in the market, because the merchantable grain must sell at the price of the low grade. Care must be taken to plant the several fields at different periods, so that the harvest will not be too crowded. It requires much more care to produce a strictly first-class quality of rice than is found necessary in the production of any other cereal, and nearly every fall prime offerings are the exception.

INJURY TO BLOOM.

If it is very showery during the period of bloom, pollination is frequently incomplete, with consequent reduction in the crop. This rarely occurs with early planted rice. Occasionally the rice crop suffers from severe storms about the period of ripening. Fortunately these disasters are mainly local, and limited to the equinoctial period. Otherwise rice has few enemies, and may be regarded as the most reliable of all cereal crops. On this account, as well as for its food value, it has been adopted as the staple cereal in countries having a dense population, where any considerable failure of the crop would involve starvation for thousands.

FLOODING.

Depth of Water.—Except where water is necessary for germinating the seed, flooding is not practised until the rice is 6 to 8 inches high. If showers are abundant enough to keep the soil moist it is better to delay flooding till the rice is 8 inches high, as there is considerable danger of scalding the rice when very young. At 8 inches high a sufficient depth of water can be allowed on the field to prevent scalding. The depth of water that should be maintained from the first flooding until it is withdrawn for the harvest depends upon other conditions. If the growing crop thoroughly shades the land, just water enough to keep the soil saturated will answer. To be safe, however, for all portions of the field, it should stand 3 to 6 inches deep, and, to avoid stagnation, it should be renewed by a continuous inflow and outflow. In case the stand of rice is thin the water should be deeper. A flow of water through the field aids in keeping the body of the water cool and in preventing the growth of injurious plants that thrive in the stagnant water. The water should stand at uniform depth all over the field. Unequal depths of water will cause the crop to ripen at different times.

Uniform Ripening.—The planter should particularly note the importance of not making the fields too large. It impedes complete drainage. It is inconvenient to have large ditches intersecting the fields. The simultaneous maturity

of all portions of the field is desirable if it is to be cut with a twine binder. This can be secured by uniform and good drainage, by ploughing, harrowing, planting, and rolling the same day, and by planting the seed equally deep and evenly distributed. The flooding water must stand in all portions of the field at equal depth and temperature. Emphasis is placed upon having the harrow closely follow the plough, to be immediately succeeded by planting and rolling. This is necessary to conserve the moisture, unless there are frequent showers during the planting season. No field should be so large that the work of planting cannot be completed within three or four days.

Time to Withdraw the Water and to Cut the Grain.—As soon as the grain is in the dough the water should be withdrawn. Sufficient moisture will remain in the soil to mature the crop. Experiments with wheat have demonstrated that there is a considerable gain in commercial value by cutting nearly two weeks before the grain is dead ripe—*i.e.*, when the straw is yellow and the kernel still in the stiff dough state. The Japanese apply the same principle in cutting rice; it is cut when the straw has barely commenced to yellow. If cutting is delayed till the straw shows yellow to the top, the grain is reduced in quality and quantity, and the straw is less valuable. There is also a considerable increase in the loss by shelling in handling in the field.

HARVESTING.

When rice is ready for the harvest, cutting should proceed rapidly. If a field requires more than four days to complete the cutting, it is too large and should be divided. The length of straw to be cut is a matter of opinion with each planter, but if cut in the stiff-dough state of the kernel sufficient straw must remain with the head to enable the grains to mature. On an average $2\frac{1}{2}$ feet of straw will be found practical. The smaller the bundle the better for curing. In case the field is wet the bundles should be taken from the reaper direct to high land and there shocked. While care should be exercised in all the various processes of rice production, it is most necessary in shocking, which is generally left to some boy who can do nothing else. Thirty per cent. of the crop may be lost by improper shocking. The following directions will aid :—First, shock on dry ground ; second, brace the bundles carefully against each other, so as to resist wind or storm ; third, let the shock be longest east and west and cap carefully with bundles, allowing the heads of the capping bundles to fall on the north side of the shock to avoid the sun. Exposure of the heads to sun and storm is a large factor in producing sun-cracked and chalky kernels, which reduce the milling value. The idea is slow curing in the shade to produce that toughness of kernel necessary to withstand the milling processes. In the shock every head should be shaded and sheltered from storm as much as possible. The rice should be left in the shock till the straw is cured and the kernel hard.

Whether stacking rice from the shock is a benefit depends upon the condition of the grain and straw at the time of stacking and how the stacking is done. If too much heat is generated, stacking is an injury. It is, moreover, of less importance with rice than with wheat. Judging from the practice in other countries, rice well cured in the shock and aired after thrashing ought to keep in the bin without heating.

THRASHING.

With the large steam thrashers there is frequently considerable breakage and waste of grain. Great care should be exercised to avoid this and preserve every part which has been won from the soil with such labour. At the commencement of thrashing, examination should be made to see that there is no avoidable breakage of the grain. If the rice is damp when delivered from the machine it should be spread upon a floor and dried before sacking, so as to be in the best condition for the market, for colour of grain affects the value.

FERTILISING.

It has been claimed that the flooding of the ricefields restores to the soil as much nutritive material as the rice crop removes. Where lands are flooded from rivers like the Mississippi or the Nile, which carry a large amount of silt, this may be true. It is not the case where flooding is done with pure water. The continued fertility of the ricefield can only be maintained by restoring to the soil annually a portion of what the crop removes. Whether this can be more economically done by the use of commercial fertilisers and ploughing under of the rice straw, or by following occasionally and using some renovating crop as a green manure, is an economic question to be determined by each planter according to the conditions presented. Repeated trials of commercial fertilisers have almost invariably shown gains in the quality and quantity of the crop more than sufficient to cover the cost. Summer fallowing, where it can be practised, is, in addition to its renovating effect, a substantial aid in destroying noxious grasses and red rice. It appears to be a general impression that red rice can be destroyed by allowing the field to remain without crop for a few years and pasturing with sheep or hogs. In one well-established case this was tried for eight years, and at the expiration of that period the field was ploughed and still produced red rice. Close grazing is helpful, but where summer fallowing can be employed it is far more advantageous than grazing.

WAGES AND EFFICIENCY OF LABOUR IN DIFFERENT COUNTRIES.

The great variations in wages and in the area which can be cultivated by the labourer in different countries are shown in the following table:—

Number of Acres One Man can Farm in Rice, with Wages, in Different Countries.

Countries.	Acres.	Farm Wages in Gold per Year, with Board.	Countries.	Acres.	Farm Wages in Gold per Year, with Board.
Japan	½	$10 to $18	Spain...	5	$40 to $60
China	½ to 2½	8 to 12	United States—		
Philippines ...	2½	15 to 20	Carolinas ...	8	92 to 120
India	3	10 to 20	Mississippi delta	10	120 to 144
Siam	3	10 to 20	Southwestern ...		
Egypt	4	15 to 30	Louisiana and		
Italy	5	40 to 60	Texas	80	180 to 216

THE DUMONT COFFEE COMPANY, LIMITED.

At the fourth annual general meeting of the Dumont Coffee Company, Limited, held at Winchester House, Old Broad street, London, E.C., on Friday, the 22nd day of June, 1900, the following report was submitted:—

The directors submit the general balance-sheet and profit and loss accounts for the year ending 31st December, 1899. The profit for the year amounted to the sum of £41,761 4s. 5d.; carried forward from 1898, £2,325 8s. 3d.=£44,086 12s. 8d. Interest at 5½ per cent. per annum has been paid on the debentures, amounting to £21,989; interim dividend on the preference shares paid in July, 1898 (together with income tax thereon), brought forward in the balance-sheet last year, £15,000=£36,989, leaving a balance proposed to be carried forward of £7,097 12s. 8d. The coffee crop amounted to 93,301 cwt., against 41,476 cwt. for the previous year. Of this, 31,687 cwt. were sold in London, and the remainder in Santos and New York. The gross average price realised for all the coffee was equivalent to 29s. 4½d. landed in London, taking the exchange at 7½d. per milreis, which is the rate fixed by the auditors for the year's

accounts. During the greater portion of the selling season, the coffee market was at a lower level than ever recorded during the last half-century, and for this reason the average price obtained for the company's crop was unfortunately extremely low. The spot price for good average Santos coffee for the five months—June to October, 1899—was 26s. 10d. per cwt., the rise in the coffee market not taking place until the end of 1899 and the beginning of 1900, by which time the greater portion of the company's crop had been sold; the present price is about 38s. 6d. per cwt. As the company's pulped coffee formed the greater portion of the earlier part of the crop, it obtained a lower average than the unpulped coffee, which did not come forward for sale until the latter part of the season. The directors have satisfaction in recording that the large crop of 93,301 cwt. was well harvested in good time, which was due to the now completed railway system over the property, and to a well-organised labour force under European management. The shareholders will be glad to know that "Dumont" coffee has established a good name in European markets on account of its superior flavour, as compared with Santos coffee generally, and now commands a better price than other Brazilian coffees on the London market. This the directors consider is attributable to the complete system of drying grounds and storing sheds with which the properties have been equipped, as well as to the careful work of the staff. Mr. G. A. Talbot visited the property in September last, in accordance with the desire of the shareholders as expressed at the last annual general meeting. He was then able to go carefully into all details of expenditure with the company's manager and staff, with the result that the directors have been able to effect economies in working. The manager reports favourably on the condition of the coffee trees, both old and young, and estimates the current crop at 75,000 cwt., which at present prices would yield a considerably increased profit as compared with the year under review. The weather recently has been somewhat unfavourable, but, cabling on the 31st May last, the manager reports:—"I have hope that 'Dumont' estimate may probably be obtained." There are now 10,918 acres in bearing, and 2,343 acres of young coffee, making a total of 13,261 acres planted.

ANALYSES OF NEW GUINEA CANES.

Mr. A. A. Ramsay, Director of the Sugar Experiment Station, Mackay, reported last July on some New Guinea canes which he had analysed. The report was published in the July number of the *Journal*. The idea originally was to give these analyses from month to month, to show growers of these varieties how the cane sugar increases and the fruit sugar decreases as the canes get older, but, as such results could only be published too late to be of immediate value, Mr. Ramsay has made out an average of some thirty of the canes analysed six weeks later. He says:—The thirty New Guinea canes, analyses of which I sent you in July, were again analysed on 15th August, six weeks later than the first series of analyses. As a detailed list would probably be too long, I give you only the average of all:—

	Average of Analysis made 5th July, 1900.	Average of Analysis made 15th August, 1900.
Cane sugar	11·68	13·48
Fruit sugar	·94	·48
O. Organic matter ...	2·31	1·93
Brix	14·93	15·89
Quotient	78·2	84·83

Cane sugar : Fruit sugar = 100 : 8·05. Cane sugar : Fruit sugar = 100 : 3·55

THE UTILISATION OF MEGASSE AS FUEL, SO AS TO GET THE BEST RESULTS IN STEAM.

The great aim of managers of sugar-houses is to reduce expenses, as well as to increase the output of sugar from the minimum tonnage of cane. There is one item in the expenses which has always claimed attention from experienced managers. That item is fuel. Wood fuel is, owing to the reckless destruction of timber, becoming more and more scarce and expensive. We can recall the time when she-oak timber (the best fuel for the furnace) was so plentiful that nothing else was used, and the price was only about 4s. per cord. To-day it is necessary to economise as much as possible the item of fuel. Megasse, which used to be allowed to rot in a heap, is now utilised as fuel to make steam, and opinions differ as to its value as a steam producer. The following extracts from the *Louisiana Planter* will, therefore, doubtless prove of interest to Queensland millowners.

The first article we reproduce is a paper read by Mr. R. G. Comeaux, before the Louisiana Sugar Planters' Association on 14th June, 1900. Mr. Comeaux says:—

There is, for the present at least, one ray of light in the sugar industry. To say how long it will last no one can predict, but it is well to make hay while the sun shines; therefore it becomes imperative that we use all available means to reduce the cost of the production of sugar in Louisiana. There are many channels through which, by careful investigation, sugar-house expenses could be lessened; but, as the topic to be discussed to-night is so far-reaching in its merits, I will confine myself entirely to this one.

Bagasse can be put to several uses; it has been shown by experiment that a good paper can be made from it; should that prove to be profitable it might induce more cane to be worked by diffusion, since by that method more sugar can be obtained. As a fertiliser for sugar-cane it is excellent. I can say from experience that when applied not too fresh, it not only produces a vigorous growth but also ripens cane. Now when it comes to the utilisation of bagasse as fuel to make steam, then we come to the conclusion that so far it is the most profitable use to which we can put it.

Barring diffusion, almost every sugar-house in the State uses its bagasse as fuel to make steam; to say that no benefit is obtained from it would be misleading. But is there really as much gain from its use as a great many claim? I doubt it. The great number of different kinds of bagasse burners now in use only tend to show that no positive method has yet been settled upon to get the best results in steam. It is very true that to-day the consumption of bought fuel is not as great per 1,000 lb. of sugar as it was some years back. The use of the double and triple effects, the covering of steam pipes, the continuous operation of the house, and many other things not used years ago, have helped to bring about this saving of fuel, therefore all gain cannot be attributed to bagasse alone. I don't mean by that to say that bagasse is not a valuable fuel; on the contrary, I know it is, but what I do mean to say is, that no burner has yet been erected which gives us all the benefit which is possible to obtain from it as fuel.

The Dutch oven seems to be the favourite way of burning bagasse on many places. When it comes to simplicity, or, in other words, an easy way of getting rid of bagasse without much trouble, then we have it exactly. But stop one moment—examine this furnace while in operation, and you will see that while considerable heat is produced, it comes from a small percentage only of the bagasse which is being actually consumed. The bagasse, being admitted in large quantities through one hopper, is bound to heap up in pyramid shape, which makes the pile so thick that the fire cannot penetrate the middle; as a consequence you have but a comparatively small fire around the bottom of the pyramid; in other words, you are burning, perhaps, twice the amount of bagasse required to produce the same heat.

So much for Dutch ovens. Now we will take the Fisher-Hogan burner. It it the only burner that has the advantage of an even distribution of bagasse on the bars. While that is a great point in its favour, I believe it has its defects also. The buckets or fans which introduce the bagasse into the furnace drive in cold air; this air, instead of being a benefit is a detriment, since it enters directly under the boilers, which it follows until it is consumed, and that has to be done at the expense of heat. Notwithstanding this disadvantage, the Fisher burner is a good one and should give good results.

Now, while I have only been able to find fault with existing bagasse burners, what can I say in their favour? Of course every man has his own idea, mine about bagasse is: That it should be treated the same as wood, coal, or any other fuel, and I believe my first and last experiences will sustain me in that belief.

During my career of sugar-planting I have worked four different kinds of patent burners, always believing the last would be the best; but I find, after fifteen years' experience, my first simple attempt to burn bagasse as fuel to be the best. I will describe it. In 1886 the sugar-house on the place which I managed consisted of a battery of open kettles with an open strike pan. All syrup made during the twenty-four hours was cooked into sugar in the day-time, so that at night steam to grind cane only was required. The bagasse was then consumed in an open chimney, such as was so common in those days, simply to get rid of it. I had at the time an intelligent fireman (a German); he saw the great heat which the bagasse produced at times in this open chimney, so he suggested that if I would furnish him with a boy to keep his coal-box supplied with bagasse, he would fire it during the night. I did so. The bars, which were set for coal 20 inches from the boilers, were not changed. He fired the bagasse by hand with a fork or shovel, the same as coal, being careful to keep the bars completely covered about 8 inches deep. The result was wonderful; it produced all the steam required to grind cane, which was 90 lb., and from that day to the finish not a pound of coal or wood was used in the furnace when the pan was not working.

While this work was going on, I think it would be safe to say that not one-tenth part of the bagasse being made during the time was consumed under the boilers. This gives room for reflection. Last season I had occasion to grind seventy barrels of syrup in a small sugar-house. It contained a light three-roller mill, 3 feet long. The extraction, I should judge, was about 55 per cent. The juice was evaporated in two clarifiers, then boiled into syrup in the strike pan. The steam to run the house was generated in two double-flued boilers 42 inches by 28 feet, grate bars set 24 inches from boilers. While in operation this furnace was kept filled with wood and the bagasse was dropped through one hopper between boilers on top of the wood. The combustion was the best I ever saw; the flame enveloped the whole 28 feet of boiler, and much of it returned through the flues. While this might appear to some to be a wood instead of a bagasse furnace, the results were so good that the actual saving in bought fuel was more than 50 per cent.

This paper is a statement of the planter's side of the case; it is my own experience, and I shall be glad to hear what others have to say on the subject.

Mr. Geo. P. Anderton at the same meeting read the following paper:—

The purpose of this paper is not to treat the subject from a theoretical point of view, but with the purpose of explaining the fundamental principles which govern the utilisation of this substance as fuel based on my experience as an engineer.

Bagasse from cane with 10 per cent. of fibre, as usually made in Louisiana with an extraction of 75 per cent., is composed about as follows:—

Water, 51 per cent.; fibre, 40 per cent.; sugar, 6 per cent.; molasses (dry matter only), 3 per cent.; (authority, Dr. O. W. Atwater).

It will therefore be noted that over half the fuel is moisture, which abstracts from the fuel the heat necessary to turn it into steam and also to raise it to furnace temperature.

The fuel value of the combustible elements is approximately 4,000 B.T.U., of which 700 B. T. U. are necessary to evaporate the moisture and raise it to furnace temperature, making the heat available per pound of combustible as 3,300 B. T. U.; comparing this with Pittsburg lump at 14,000 B. T. U. per lb. would give a fuel value of $4\frac{1}{3}$ lb. bagasse equal to 1 lb. of Pittsburg coal.

An efficiency of 100 per cent. of the total available heat being unattainable, it will be necessary to see what losses there are which can be minimised; these are, loss by imperfect combustion, or by an excess of air, and in the latter case by the consequent ejection of the products of combustion at too high a temperature through the smoke stack. The first loss—*i.e.*, by imperfect combustion, which can only be accurately detected by an analysis of the flue gases, may be due to a want of sufficient air supply and consequent low furnace temperature.

The combustible in bagasse being mostly carbon, which to be completely consumed requires that to every atom of the original carbon there shall be supplied two atoms of oxygen at a temperature of association or chemical combination; should the temperature be too low in the furnace, there will be no chemical union, or, at best, an imperfect one, in which the atom of carbon takes unto itself, for better or worse, one atom of oxygen, and as a result there passes merrily up the flue a combination which, were it brought up to a higher temperature and allowed to combine with another oxygen atom, would by this union give off heat.

The second loss—*i.e.*, by an excess of air—is not a fuel loss, directly; it is in the utilisation of this fuel, however, a most important factor. If not enough air be supplied, we get our first loss, incomplete combustion; and if more be supplied than is required for perfect combustion there is a loss, first, by lowering the furnace temperature, which will cause incomplete combustion, and, secondly, by absorbing heat from the fire to heat the excess of air and rendering the fuel less available for steam making purposes, and, thirdly, as the amount of heat transmitted is directly dependent upon the difference of temperature of the flame in the fire, and the water in the boiler, there will not be so much heat absorbed on account of there being less difference in temperature between the water in the boiler and the products of combustion, consequently the stack gasses will be higher in temperature and of greater volume than if only a sufficient volume of air were supplied to maintain proper combustion.

The last loss I mentioned was the ejection of the stack gases at too high a temperature. This may be caused by too great an air supply, and also by there being too much bagasse burnt in the furnace and too little effective heating surface employed in the boiler to absorb the heat generated beneath it.

From the above tabulation of the losses, it will readily be seen what means must be used to secure the maximum results from good bagasse.

Firstly, there must be a furnace lined with refractory material so as to surround the fuel and the products of combustion with a surface which will not rob them of heat until they shall have attained as high a temperature as possible, thus ensuring a perfect combustion in the furnace, hence the almost universal adoption of the Dutch oven for burning bagasse.

In order to not get an excess of air, a thick fire should be carried so that as the air enters it must pass through a large quantity of fuel at a high temperature, so that it will have a chance to combine with the combustible elements of the fuel. In order to get sufficient air to support combustion there should be either sufficient natural draft or mechanical means employed to draw or force the necessary quantity of air through the fuel.

In order that the temperature of the stack gases should be kept low, a large ratio of heating surface to grate area should be employed, and the minimum amount of air required supplied to the furnace.

These conditions are not always attainable in sugar-house work, as the quality and quantity of fuel supplied varies within very wide limits. It is only by the employment of skilled and intelligent labour in the handling of this fuel in its utilisation that any pretence towards economical working can be attained.

Too frequently the bagasse burner has been in charge of a plough-hand darkey, whose main occupation is chewing cane 90 per cent. of the time and endeavouring to arrange the slides and hoppers and blower engine so as not to require any further attention from him, notwithstanding the fact that the bagasse supplied may vary in quantity from nothing to 25 per cent. more than the furnace can economically burn, which excess he should store to utilise when the mill might be temporarily stopped.

I will give, in a general way, the requisite data necessary to utilise the bagasse of 75 per cent. extraction at a grinding rate of 10 tons of cane per hour, this quantity being selected to simplify calculation.

This quantity will give 5,000 lb. of bagasse, having a fuel value of $4\frac{1}{3}$ lb., equal to 1 lb. of Pittsburg lump, consequently at the equivalent evaporation of $8\frac{1}{4}$ lb. of water per lb. of coal, we would have, in the 5,000 lb. of bagasse, a horse-power value based upon the standard of the A.S.M.E. of 288-h.p. per hour, or, roughly, $1\frac{1}{4}$-h.p. per ton of cane ground per day of twenty-four hours.

As the air supply is a very vital point, let us examine into the composition of the bagasse with a view to finding out how much air is actually required for combustion.

Professor Stubbs tells me that the dry fibre of the above bagasse will contain, on an average, 44 per cent. of carbon; adding to this carbon contained in the sugar and molasses not extracted by the mill, we have, in the 5,000 lb. of bagasse, approximately 1,500 lb. of carbon. As 1 lb. of carbon for its proper combustion (theoretically) requires 11·3 lb. of air at 62 degrees Fahr., we would, therefore, require on the above basis 16,950 lb. of air to be supplied to the furnace per hour; this would be 282·5 lb. or 3,955 cubic feet per minute.

Our conclusions are, therefore, as follow:—

1st. For each ton of cane that you intend to grind per day of twenty-four hours, install in your bagasse burner $1\frac{1}{4}$-horse power of boiler. (Commercial rating.)

2nd. If you prefer natural draft, be sure you have ample, and arrange to control it by means of dampers, which may easily be regulated according to the different quality and amount of bagasse to be burnt.

3rd. If you use mechanical draft (blower) either blowing under the grate or through hollow bars, be sure that the blower is of ample capacity, but it must not necessarily be run at full speed all the time, but must be carefully regulated according to the quality and amount of fuel to be burnt.

4th. Keep a good pyrometer handy and teach the burner man how to use it, and how to regulate the amount of air, so as to maintain the highest possible temperature in his furnace at all times, under varying conditions.

5th. Put a good, intelligent, painstaking man in charge of the bagasse burner, and put the cane-chewer to fire the battery of coal boilers. It will save your coal pile.

Mr. James Fisher, on the same topic, said:—"Owing to the present price of coal, and its scarcity, and to the fact that, with very few exceptions, there are no woodlands on our sugar plantations from which to obtain a supply of wood, to supply this deficiency in full has become an imperative necessity for the sugar-planter. To-night we are to study this important matter and the best and most practical method to obtain the full heat or fuel value from

bagasse. In fact, the very existence of the sugar plantation of to-day, where steam is used so extensively, depends upon bagasse as fuel. The writer, who is familiar as a practical and mechanical sugar-house engineer, with all the different kinds of bagasse burners used in this State, wonders why the burning of such valuable fuel has not been given more attention, as it means a large amount of money saved in the manufacture. Yet the crudest methods of burning bagasse to generate steam exist to-day on almost all of our sugar plantations. As long as the present system continues, using the old time hopper with its door opening and dumping the bagasse in pyramidal piles through the hopper openings, we will smother the flames by the constant feed, the uncovered portions of the grate bars will admit an excess of cold air, and the obnoxious sparks and smoke will ascend through the hoppers. The still more ancient system of piling the bagasse on the bottom of the furnace with its large tuyeres through which air is forced above the bagasse and from the sides of the furnace and underneath is equally unsatisfactory. Just as long as these old-fashioned methods prevail in burning bagasse they will only do two-thirds of the work at best, or even less than that. If we should dump coal through hoppers in pyramidal piles without working the fires, as we now generally dump in the bagasse, we would not have over one-half the boilers necessary for our sugar plantations—a fact which cannot be disputed by any practical sugar-house engineer who has made this part of the work a study. I contend that we are to-day burning up and wasting with only two-thirds of its useful effect, the bagasse from our sugar-mills, our most valuable fuel, which costs nothing. Gentlemen, we can burn bagasse in a more intelligent manner than this at the present day, and the reason that we are not all doing it is because we have not studied closely the best method to secure the best results. There is only one plan, and it must be generally adopted before the full value of bagasse as fuel can be secured, and that is by an automatic feeder and scatterers by which the bagasse may be evenly and perfectly distributed over the entire surface of the grate bars. This is now done by mechanical appliances which will produce almost perfect combustion. A fine and steady flame from the front to the back of the boilers is generated, and the full benefit of bagasse as a fuel for generating steam is obtained. If such a type of bagasse burner were operated more extensively on our sugar plantations, the coal pile would go much further in taking off the crops. There are several automatic bagasse distributors of this type which are on some of our large sugar plantations, where they are doing excellent work. One certain plant with this type of burner secures an extraction of 73 per cent. of juice from 550 tons of cane per day. The bagasse is evenly distributed over the grate and under 72-inch boilers, two to each battery of 300-horse power, or 150-horse power to each boiler, and is doing more work than the batteries of two boilers of the same size and dimensions fired with the best Pittsburg coal, and handled by first-class firemen. If bagasse will do this amount of work with automatic distributors, the value of bagasse as fuel burned by this modern method must have been obtained. These furnaces have been seen in operation by some of our leading planters, and there may be some of these gentlemen at this meeting who could explain the operation of this desirable method of burning bagasse intelligently.

GUTTA-PERCHA.

Gutta-percha in Sumatra and Borneo is being exhausted, owing to the reckless and primitive way in which the trees are treated. The *Scientific American* suggests the Philippine Islands as an excellent place for the profitable growing of gutta-percha.

Forestry.

SOME TIMBER TREES OF QUEENSLAND.

By J. W. FAWCETT,
Member of the English Arboricultural Society.

NATIVE ASH (*ELÆOCARPUS OBOVATUS*, G. Don).

Botanical Description.—The Native Ash is a tree of varied size. When growing in suitable localities it is a fine noble tree, reaching to a height of as much as 130 feet with a diameter up to 5 feet, but in general only a medium-sized tree growing to a height of from 30 and 40 feet to 80 and 90 feet, with a diameter of from 12 to 20 and 30 inches.

Leaves.—The leaves are alternate, or rarely opposite, oval shape, from 2 to 4 inches long, thin and of a leathery texture.

Flowers.—The flowers are numerous, small, and white, either solitary or clustered in axillary racemes. They are in bloom from December to March.

Fruit.—The fruit is a globular or oval drupe, generally of a blue colour.

Vernacular and Scientific Names.—The Native Ash, so called from the resemblance of its timber to the British Ash (*Fraxinus excelsior*), is also known as the Pigeon-berry Ash, from its fruit being a favourite food of some of the Australian wild pigeons, and Tiny Quondong, from its fruit being similar to the Quondong (*Elæocarpus grandis*, F. v. M.), but much smaller. The generic name, *Elæocarpus*, was given by Linnæus to this genus from the supposed resemblance of the fruit of some of the species to that of the Olive; whilst the specific name, *obovatus*, was given to this species by George Don, a British botanist, from the obovate shape of the leaves.

Distribution.—The Native Ash is common in the scrubs on the banks of rivers, and in coastal scrubs in Eastern Queensland. It is also found in New South Wales, North Australia, and New Guinea.

Use.—The Native Ash yields a firm, light, tough, fine, and closely grained, easily worked, whitish timber, much used for making oars.

THE BLUE FIG, OR QUONDONG (*ELÆOCARPUS GRANDIS*, F. v. M.)

Botanical Description.—The Blue Fig, or Quondong, is a large and tall slender tree, growing to a height of from 80 or 90 to 100 or 120 feet; with a diameter of from 24 to 36 or 48 inches. The trunk is erect, and the branches either almost forming whorls around the stem, or thinly scattered over its lofty head.

Bark.—The bark is smooth and thin.

Leaves.—The leaves are alternate or rarely opposite, lanceolate or oblong, from 4 to 6 inches long, pointed, more or less bordered by teeth, thin, and of a glossy bright-green, often more or less coloured before falling.

Flowers.—The flowers, which appear from January to May, are large, in short, dense axillary racemes, and of a yellowish or dirty white colour, with the petals much cut.

Fruit.—The fruit is a globular drupe, of a blue colour, about an inch in diameter, containing a rough stone. The fruit, which is ripe from September to December, is eaten by children.

Vernacular and Scientific Names.—The Blue Fig, so-called from its colour and its fig-like appearance, is also known as the Quondong, an aborigine name also applied to other wild fruits. The specific name, *grandis*, was given to this tree by Baron Von Mueller, the Victorian Botanist, from its grand appearance, being one of the largest and tallest of the trees of the scrubs.

Distribution.—The Blue Fig is found in moist, low, rich, coastal scrubs of Queensland, and also in New South Wales.

Use.—The Blue Fig yields a soft, tough, close-grained, whitish timber, which is of some value for general building purposes and railway carriage brakes. It is largely used for weatherboards in North Queensland, where it does not seem to be greatly affected by the white ants (termites).

THE BLUEBERRY-TREE (*ELÆOCARPUS CYANEUS*, Ait.)

Botanical Description.—The Blueberry-tree is usually a small tree or tall shrub, growing to a height of from 30 to 40 feet, with a diameter from 12 to 18 inches, though it sometimes attains a height of as much as 60 feet, with proportionate diameter.

Leaves.—The leaves are alternate or rarely opposite, oblong lanceolate in shape, from 3 to 4 inches or more in length, more or less serrated, of a leathery texture, and very prominently veined.

Flowers.—The flowers, which appear from October to December, are rather small and in axillary racemes, shorter than, or as long as, the leaves, with pinkish, rose, or white petals, and much divided.

Fruit.—The fruit is a globular or oval drupe, of a dark-blue colour, about ½-inch in diameter, and one-seeded.

Vernacular and Scientific Names.—The Blueberry-tree, so called from the colour and form of its fruit, is also known as the Native Olive, from its olive-like drupes; White-Bark, from the colour of its bark; and White Boree, from the colour of its timber—Boree being an aborigine name generally applied to *Acacia pendula*, A. Cunn. The specific name, *cyaneus*, was given to this species by W. T. Aiton, a former director of the Botanic Gardens, Kew, England, from the blue colour of its fruit.

Distribution.—The Blueberry-tree is found in both open and scrubby localities in the coastal districts of South Queensland, and also in New South Wales and Victoria.

Use.—The Blueberry-tree yields a soft, close-grained, whitish timber, suitable for carving and wood-engraving.

This plant, as a shrub, is well known to cultivators in Europe.

THE CANDLENUT (*ALEURITES MOLUCCANA*, Willd.)

Botanical Description.—The Candlenut is a tree of considerable size, being generally tall with a wide-spreading head, growing to a height of from 70 or 80 to 120 feet, with a diameter of from 20 to 40 inches. Both the leaves and young shoots are clothed with a more or less dense mealy substance which gives to the foliage of the tree, when seen from some distance, a remarkable silvery appearance.

Leaves.—The leaves are alternate, large, and either entire and ovate-lanceolate, or divided into from three to seven lobes. It is generally the leaves of the old trees that are entire, and those of the young ones that are divided. They have long petioles or leafstalks.

Flowers.—The flowers are monœcious (*i.e.*, both male and female flowers are found on the same tree), and arranged in broad terminal panicles.

Fruit.—The fruit is large, from 2 to 4 inches in diameter, containing from one to three or even more globular nuts or seeds, each about 1 inch in diameter, and having hard shells.

Vernacular and Scientific Names.—The Candlenut derives its name from its seeds being used as a substitute for candles in the South Sea Islands. It is also known as the Otaheitean Walnut, so called first from being found in Otahiti, and recently from the seeds resembling walnuts in size and taste.

The generic name, *Aleurites*, was given to this genus by R. and G. Forster, botanists and writers on Australian plants, and has reference to the mealy substance with which the whole plant is covered. The specific name, *moluccana*, was given to this species by the Prussian botanist, C. L. de Willdenow, from its being found in the Molucca Islands. It is also known under the scientific names of *Aleurites triloba*, Forst., and *Jatropha moluccana*, Linn.

Distribution.—The Candlenut is a native of the tropics of both hemispheres, and is found in the scrubs of tropical Queensland, and also in New

Guinea, in most of the islands of the Eastern Archipelego, in the islands of the South Pacific, and in Ceylon.

Uses.—The Candlenut yields a soft, light, whitish timber, which, if cut when full of sap, decays very quickly.

The roots of this tree affords a brown dye, which is used by the Sandwich Islanders for dying their native cloths.

The seeds, or nuts, which resemble walnuts both in size and taste, are used as an article of food in New Georgia, and, when thoroughly dry, are stuck on a reed and used by the Polynesian islanders, as a substitute for candles. If these nuts are eaten before they are quite ripe they are apt to make one very ill, as they are then very purgative. The aborigines of North Queensland frequently (not generally) use them as food. When the nuts are pressed they yield a large proportion of pure palatable oil, used as a drying oil for paint, and known in commerce as candlenut oil, artists' oil, and country walnut oil. In Ceylon it is called kekune oil, and in the Sandwich Islands, where it is used as a mordant for their vegetable dyes, kukul oil. In these islands alone about 10,000 gallons are annually produced. In England this oil is considered worth about £20 per imperial tun.

Mr. C. Staiger, formerly Government Analyst of Queensland, found the nuts to consist of the following:—

1. The dry nuts: Shell, 70 per cent.; kernel, 30 per cent.
2. Kernel freed from shell: Oil, 54·3 per cent.; amylaceous and nitrogenous substances, 45·7 per cent.

The cake, after the oil has been expressed, is esteemed as food for cattle. The collection of the nuts of this tree might form a remunerative labour for the residents and settlers in those districts of North Queensland where this tree is plentiful. They remain sound on the ground for a long time, the preceding year's nuts being good when the new crop falls.

In North Queensland the fruit of this tree is a favourite food of the cassowary.

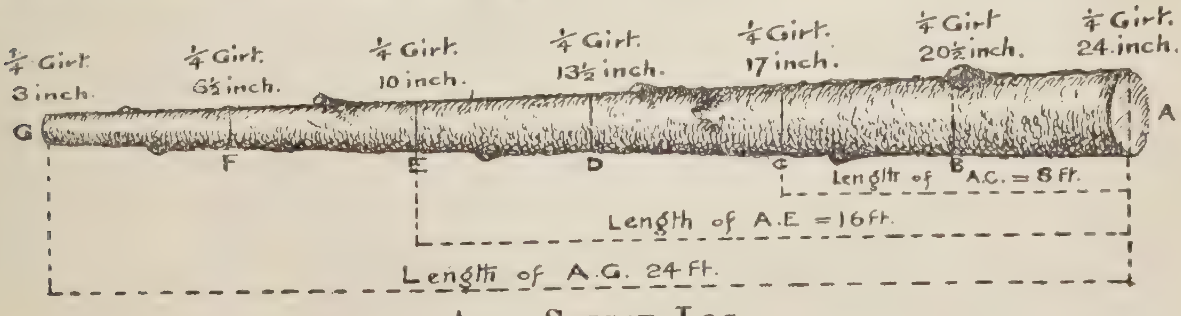
The nuts are also reported aphrodisiac.

The timber is used in North Queensland for making fruit-cases.

This tree, which is easily propagated by seed, is a hardy tree. It is commonly planted in this country as a shade tree, and is very ornamental. The seeds of most of these trees are, however, allowed to go to waste. In some countries it is cultivated for the sake of its nuts. It, however, stands frosts very badly, and is not suited for exposed situations. It grows very rapidly, and is hard to destroy in its native wilds, being one of the first to spring up after the scrub has been cut down.

MEASURING LOG TIMBER—A PARADOX.

In the case of expensive timbers such as ebony, cedar, and building timbers of European forests, the addition or subtraction of a few cubic feet makes a remarkable difference in the price received for a log. It is quite possible for two persons to measure a log by the same method, and although their measurements differ by several solid feet, yet for both to be correct. This sounds strange, but it can be proved. We will suppose a very tapering log, as shown in the diagram, 24 feet in length with a quarter girt of 24 inches at the butt, and 3 inches at the head. First let us measure it as a single log—



As a Single Log.

Our log measures 24 feet in length, and one-fourth of the girt at the butt A is 24 inches; the quarter-girt at the top G is 3 inches, and the quarter-girt in the middle at D is 13½ inches. From these dimensions AG is found to contain 30 feet 4 inches 6 parts.

The Same Log Measured in Three Pieces.

Now let us cut the log into three equal parts, AC, CE, EG.

First we take AC, which is 8 feet long, 8 feet in girt at the butt-end A, 5 feet 8 inches in girt at the top C, and 6 feet 10 inches in girt in the middle B. Take the quarter of all these dimensions, and we have the following quarter-girts: At A, 24 inches; at C, 17 inches, and at B, 20½ inches. From these figures the solid content of AC is found to be 23 feet 4 inches, or only 7 feet less than the whole log AG measured together, so that by cutting off 16 feet at the top, that is from C to G, which is no less than two-thirds of the whole length, you do not lose quite 7 solid feet of timber.

Next we will take the middle log CE, also 8 feet long, the quarter girt at the butt end C is 17 inches, and at the top end E, 10 inches. The middle quarter girt at D is 13½ inches. Working with these figures, we find the log CE contains 10 cubic feet 1 inch and 6 parts. Thirdly, the remaining log EG is also 8 feet long, and the quarter girt at E is 10 inches, at G 3 inches, and in the centre at F, 6½ inches. These data work out to show that EG contains 2 cubic feet 4 inches 2 parts. Putting these results in tabular form:—

	Cubic feet.	Cubic inches.	Parts.
AG, the whole log measured singly makes... ...	30	4	6
AC, ⅓ of the log ,, ,, ,, ...	23	4	0
CE, ⅓ ,, ,, ,, ,, ...	10	1	6
EG, ⅓ ,, ,, ,, ,, ...	2	4	2
Total contents	35	9	8

Thus the gain by cutting the log into three pieces and measuring each separately is a little more than 5 cubic feet 5 inches.

The Same Log Measured Without the Butt End.

Again, let us try another plan. Suppose 8 feet to be cut off the butt-end—viz., from A to C. Let us then measure the remainder, CG, which is 16 feet. The side of the square at E is 10 inches. The resulting measurement is 11 feet 1 inch 4 parts.

The Same Piece Measured in Two Dimensions.

Next, suppose the log cut through at E. First measure CE. 13½ inches is the side of the square at D. The length is 8 feet. Result: 10 feet 1 inch 6 parts. Now we measure the piece EG. The side of the square at F is 6½ inches and the length 8 feet. The content is 2 cubic feet 4 inches 2 parts.

So that the whole piece CG measures to one solid foot and a-half more, when it is measured at twice, than when it was measured in one piece.

Now let us try the AE by itself and see what it will produce. AE, observe, is 16 feet long and one-fourth of the girt in the middle at C is 17 inches. Taking out the quantities, AE will be found to contain 32 feet 1 inch, 4 parts of timber; notwithstanding 8 feet at the top, from E to G, is cut off and is not taken into account at all, whereas, when this top was left on, the whole, from A to G, measured but 30 feet 4½ inches; so that by cutting off and rejecting 8 feet at the top, we gain near 2 feet of timber.

In the case of timber worth to the timber-getter only 4s. per 100 feet, the difference in measurement would matter little, and besides he would not be likely to cut a 24-feet pine log into 12-feet pieces unless it were of very large girth. But where cedar or any of the very expensive timbers such as ebony, mahogany, walnut, sandalwood, rosewood and many other timbers valuable for cabinet-makers and upholsterers, the question of a few feet makes a very great difference. For example, if the log depicted in the diagram were worth 2s. per foot, it would be worth £3 11s. 6d. when measured in three pieces, but only £3 0s. 6d. when measured in one piece. Thus 11s. are gained by making one log into three.

Science.

UTILISING SAWDUST.

At the various sawmills in the colony large quantities of sawdust accumulate. This sawdust is utilised in many ways, but it would seem that a way has been found in Austria to convert it into a valuable commercial article.

In the large sawmills, belonging to Mr. Joseph Fialla, in Austria, the sawdust is made up into bricks, treated in an inexpensive manner, but resulting in a very valuable fuel for furnaces, and also for household use. Our sugar-mills would doubtless become customers for a fuel which, besides being equal in heating power to lignite, burns with a residue of only 4 per cent. of ash. The sawdust is first impregnated with a mixture of tarry substances, and is then brought up to a proper temperature, which temperature any Queensland manufacturer would have to discover by experiments. It is next passed over a plate of iron heated by steam, from which a steam-driven carrier takes it to a screw press, where it is compressed into the form of briquettes of a uniform size. The press is able to turn out nineteen bricks per minute. Each brick weighs $\frac{2}{5}$ lb., and measures 6 by $2\frac{1}{2}$ by $1\frac{1}{2}$ inches. As already stated, the calorific power is equal to that of lignite. Mr. Fialla's factory turns out 6,000,000 of these briquettes annually at a cost of about 8d. per 1,000. As the selling price is about 4s. per 1,000, it would seem that there remains a large margin of profit.

PRUNING THE TOMATO.

When the fruit bud appears we want to look out for suckers, which must be plucked off as fast as they appear. Keep in mind a straight, upright stalk, instead of the usual crawling vine we so often see. When the young fruit begins to form, put a stake about 4 feet long down on the opposite side of the fruit bud, tie a cotton string around the tomato stalk immediately under the fruit bud, leaving the cord loose, and then to stake, repeating this as the fruit buds appear. This holds the plant firmly and causes it to grow straight and graceful, instead of falling all over the garden. Keep the suckers off by all means. When from four to eight fruit buds appear, according to the fertility of the soil, top the plant, and you will have a magnificent crop of tomatoes, whereas if you let them go to vine you will have but very few. If they fail to ripen, a few leaves cut from the lower part of the stalk to admit the air will hasten it. Keep the suckers down, and the fruit will continue to ripen a long time if they have water and attention.

EXPERIMENT ON POTATOES.

Mr. O'Sullivan, postmaster of Athea, county of Limerick, has made a most interesting experiment on the protection of potatoes from the blight by the application of the principle which regulates the ordinary lightning conductor. After a thunderstorm, unprotected potato stalks show signs of blight; and to guard against this, Mr. O'Sullivan put down, at regular intervals in the drills on the potato patch, stakes which stood 6 feet above the ground. From stick to stick he stretched barbed wire, and connected each line with cross wires, thus forming a sort of network over the growing crop. The wires are said to attract the lightning and convey it to the ground without injuring the crop, and the protected stalks have been found to remain green, whilst those unprotected stalks close by were affected by the blight and withered.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

Stations.	1899.						1900.						
	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.
North.													
Bowen	0·63	0·21	0·06	0·56	Nil	2·92	7·61	0·40	0·88	0·59	0·89	1·14	0·96
Cairns	2·01	1·31	3·23	0·74	0·33	4·57	43·06	1·98	8·90	3·77	3·56	1·66	0·20
Geraldton	8·93	2·85	9·03	1·03	Nil	4·89	62·26	2·36	8·86	8·86	8·33	2·34	1·02
Herberton	0·23	0·36	1·62	0·18	2·75	0·73	11·90	0·23	1·97	2·19	0·57	0·12	0·98
Hughenden	0·46	2·05	Nil	0·45	1·05	0·33	6·43	1·04	0·01	Nil.	0·11	0·02	2·45
Kamerunga	...	...	...	...	...	...	...	1·01	8·60	3·25	3·65	Nil.	0·18
Longreach	1·08	0·28	0·06	0·27	0·67	Nil.	1·68	0·48	Nil.	Nil.	0·14	Nil.	2·34
Lucinda	2·78	0·80	0·97	0·02	1·26	1·02	37·35	1·71	4·90	4·44	9·08	1·10	1·04
Mackay	2·29	2·37	1·33	0·19	0·49	7·65	20·86	0·65	4·12	2·40	2·89	2·00	3·25
Rockhampton	2·23	1·71	1·96	2·35	1·22	11·02	4·53	0·25	1·64	0·93	1·38	0·71	1·70
Townsville	0·78	0·89	0·01	0·35	0·16	0·53	21·09	0·07	1·68	0·87	2·31	0·41	0·57
South.													
Barcaldine	1·03	0·53	0·27	0·94	0·52	0·04	3·08	0·65	0·09	2·03	1·38	0·29	4·38
Beenleigh	6·96	2·02	3·11	2·53	1·80	7·40	5·42	3·19	3·16	1·25	7·55	2·18	4·77
Biggenden	...	...	...	...	...	...	...	0·40	2·81	0·28	3·06	1·43	3·23
Blackall	1·11	0·57	0·16	1·20	0·04	0·85	1·73	1·31	0·63	0·63	2·19	0·33	2·21
Brisbane	3·50	1·43	2·48	2·26	2·33	7·61	6·51	5·18	3·37	1·38	5·45	2 68	4·36
Bundaberg	2·33	2·62	1·67	1·60	0·06	7·62	4·63	0·86	1·86	1·15	3·97	1·46	5·20
Caboolture	4·61	1·90	2·40	2·30	2·23	7·44	3·04	4·18	5·66	1·42	7·04	2·14	3·73
Charleville	0·33	1·26	0·55	0·36	0·43	0·16	1·01	0·08	0·79	Nil.	1·15	1·31	1·80
Dalby	1·67	1·09	1·20	1·44	1·84	2·89	0·41	6·31	2·80	2·46	2·54	1·29	1·70
Emerald	1·31	2·08	1·96	1·93	1·32	0·40	3·08	1·22	3·97	0·42	2·72	1·15	3·96
Esk	2·59	1·69	2·79	2·67	2·25	5·34	1·42	2·34	4·73	1·50	4·78	1·89	2·85
Gatton College ...	2·01	1·55	2·19	2·13	3·50	5·87	2·40	4·07	3·13	2·24	4·24	1·15	2·73
Gayndah	0·86	3·34	1·24	2·73	4·59	7·37	2·52	2·07	1·11	1·22	2·57	0·88	3·36
Gindie	...	...	...	...	...	...	...	0·57	1·04	0·96	3·01	0·92	3·01
Gympie	2·26	1·23	2·11	2·41	0·39	6·44	5·59	1·84	2·76	1·05	3·63	0·82	3·34
Ipswich	2·42	1·29	2·77	2·04	3·46	4·66	2·79	1·66	1·85	1·47	4·73	1·45	2·25
Laidley	2·00	1·82	5·04	3·17	2·40	6·50	0·64	3·15	2·87	1·94	4·36	1·41	2·28
Maryborough	1·71	1·49	2·29	1·20	0·51	4·13	4·88	1·78	3·26	1·17	4·33	1·21	4·32
Nambour	4·18	1·81	3·13	2·87	3·03	11·11	4·07	5·64	4·67	2·78	7·77	1·35	3·42
Nerang	9·80	2·52	4·74	1·99	1·42	6·31	4·60	3·37	3·06	0·47	18·28	2·84	7·74
Roma	1·05	1·00	0·55	0·35	1·27	0·99	0·43	1·52	4·40	0·23	2·07	2·14	2·14
Stanthorpe	3·11	1·08	1·63	1·36	0·86	3·22	2·62	4·81	1·87	1·70	3·17	1·22	2·26
Taroom	1·27	1·60	1·55	0·83	3·32	0·65	1·78	3·65	2·92	2·11	2·55	1·40	...
Tambo	1·16	0·74	0·27	0·79	0·08	0·66	2·28	1·55	0·30	0·02	2·94	1·49	1·75
Tewantin	5·00	3·67	2·80	3·36	0·46	8·22	1·69	4·87	5·36	1·02	5·90	3·03	5·89
Texas	2·95	1·38	1·72	0·97	0·74	2·67	1·56	3·39	1·63	1·48	3·35	1·86	2·72
Toowoomba	1·75	1·63	3·15	1·43	2·36	4·75	1·01	2·90	2·87	2·00	4·67	1·69	2·47
Warwick	2·44	1·00	1·99	2·48	1·67	3·83	1·84	4·19	1·93	1·01	3·31	1·23	1·99
Westbrook	...	...	...	...	...	...	...	3·71	1·78	1·81	3·04	1·16	1·85

A. W. ANDERSON,
Acting Government Meteorologist.

QUEENSLAND PRODUCTS IN BRITISH MARKETS.

BUTTER.—Colonial butter on British markets is restricted to Canadian. Choicest, 108s. to 110s. per cwt. A small parcel of Queensland butter, per "Oroya," realised over 100s. Danish has advanced 8s. over last quotations (105s. to 108s.)

CHEESE.—Canadian, 48s. to 52s. New Zealand cheese is practically absent from the market.

SUGAR.—Refined, £16 per ton; syrups, £12 to £14.

SYRUPS.—6s. to 14s. per cwt.

MOLASSES.—5s. 6d. to 7s. 6d. per cwt.

Rice.—Patna, 13s. to 22s.; Java, 12s. 1½d. in bags to 26s. in barrels per cwt.

Coffee.—Finest Coorg peaberry, 79s. 6d. to 84s.; Ceylon plantation, 55s. to 78s.; bold blue, Dumont, 51s. 6d. to 57s.; Santos (Dumont), medium, 51s. 6d.; peaberry, 58s. to 65s. per cwt. Henry Devitt and Co. report on 2nd August: Australian coffee, 41s. 9d.; Costa Rica peaberry, 48s. in bond to 106s. (duty).

Arrowroot.—St. Vincent, 2½d. to 5½d. to 6d. per lb.; Natal, 7¾d. to 9½d.; Bermuda, 1s. 2d. to 2s. 3½d.

Wheat.—Australian, 32s. to 32s. 6d., landed; 11,000 quarters of Victorian wheat, September and on shipment, has been sold at 32s. 3d. per 496 lb.; New Zealand, 32s. 6d.; American, 3d. easier.

New Zealand Oats.—21s. 6d. to 23s. per 384 lb.

Ginger.—Calicut, brown, rough sorts, 31s.; common cuttings, 25s. per cwt.; Cochin, bold, roughly cut, scraped and limed, 75 per cwt.; demand poor.

Pepper.—Capsicums, 20s. to 90s.; Chillies, Zanzibar, 37s. to 44s.

Tobacco.—Approximately there is no change in the prices quoted last month.

Wine.—Fair, red wine (Australian claret type), in bond, 2s. to 2s. 6d. per gallon; fine old quality, 4s. 6d. per gallon; ordinary London port, £10 per pipe of 110 gallons; Marsala, £12 per pipe of 96 gallons.

Green Fruit.—Apples, Australian; no quotation. Lemons, from 21s. to 32s. per 420. Pines, each 3s. to 5s. Bananas, 9s. to 12s. per bunch.

Eggs.—Market dull. French, extra, 9s. 6d.; Italian, extra, 7s. 6d.; Hungarian, 6s. 3d.; Russian, 5s. 6d.—all per 120.

Honey.—Australian kinds neglected. Queensland, 93 cases offered, but all withdrawn, the nominal value being 24s. to 26s. per cwt.

Olive Oil.—£33 to £36 10s. per tun; eating oil, £50 per tun.

Linseed Oil.—£33 7s. 6d. to £33 12s. 6d. per ton.

Sisal Hemp.—£21 to £22.

Rubber.—New Guinea, at auction, on 27th July, 3s. to 3s. 0½d. for fine livery ball; sausage and ball mixed, 2s. 6d. per lb.

Copra.—S.S. Island, £13 15s. for bags, sun-dried; £12 15s. for loose, ex ship; £11 15s., kiln-dried.

Cotton.—Middling upland, 5$\frac{19}{32}$d.; long staple, Fiji, 6d.-7½d.

Wool.—The best movement in colonial wools (says a London exchange) continues to be in coarse and medium crossbreds, and qualities from 36's to 40's seem to have a market all to themselves. Here consumption offers a great contrast to merinos, as both combers and spinners are all very busy. It may seem a strange statement, but there is far more likelihood of a slight movement forward in medium crossbreds than in fine grades, as stocks are not excessive, and all sections of the trade have that confidence in the article which is so essential to good business. Of course, crossbreds are not suffering from the effects of any previous boom, which is much in their favour. In English sorts we have a market very similar to colonial grades, there being a fair consumptive demand at current rates; but as holders in the country are asking more than prices ruling here, it rather militates against trade.

There will be 366,000 bales available for the London wool sales, which will open on 9th October.

FROZEN MEAT.—The following are the latest quotations (15th September) for the various descriptions of frozen meat mentioned (last week's prices being also given for comparison) :—

New Zealand Mutton.

(Crossbred Wethers and Maiden Ewes.)

	Sept. 8.	Sept. 15.
Canterbury	3 9/16d.	3 11/16d.
Dunedin and Southland	$3\frac{3}{8}$d.	3 9/16d.
North Island	3 5/16d.	3 7/16d.

Australian Mutton.

(Crossbred and Merino Wethers.)

Heavy (over 50 lb.)	3d.	$3\frac{1}{8}$d.
Light (under 50 lb.)	3 1/16d.	$3\frac{1}{8}$d.

River Plate Mutton.

(Crossbred and Merino Wethers.)

Heavy	3d.	$3\frac{1}{8}$d.
Light	$3\frac{1}{8}$d.	$3\frac{1}{8}$d.

New Zealand Lambs.

Prime Canterbury (32 lb. to 42 lb.)	$4\frac{1}{4}$d.	$4\frac{1}{2}$d.
Fair average	4d.	$4\frac{1}{4}$d.

New Zealand Frozen Beef.

(Fair Average Quality.)

Ox, fores (100 lb. to 200 lb.) ...	3 5/16d.	$3\frac{3}{8}$d.
Ox, hinds (180 lb. to 200 lb.) ...	4 7/16d.	$4\frac{1}{2}$d.

Australian Frozen Beef.

(Fair Average Quality.)

Ox, fores (160 lb. to 200 lb.) ...	3 1/16d.	3 3/16d.
Ox, hinds (160 lb. to 200 lb.) ...	$4\frac{1}{8}$d.	$4\frac{1}{8}$d.

The above prices are the official quotations furnished by the Frozen Meat Trade Association. The basis of quotations is sales of lines of not less 100 carcasses of mutton or lamb, or 25 quarters of beef. All the quotations for mutton are for average quality. Quotations for New Zealand and Australian lambs do not include sales of small lambs or heavies or inferior quality.

BACON.—Danish, 60s. to 64s.; Canadian, 50s. to 52s.

HAM.—American, 50s. to 54s.

HIDES.—Hereford (95 lb.), $4\frac{7}{8}$d.; seconds, $4\frac{1}{8}$d. Cows (65 lb.), 4d.; lesser weights, from $2\frac{1}{2}$d. to $2\frac{3}{4}$d. Calf (17 lb.), $6\frac{1}{4}$d. per lb.

SKINS.—Woolled sheepskins sold in London at the end of September at a general decline of 10 per cent.

TALLOW.—Good to fine white mutton, 27s. to 28s. 6d.; fair to good beef, 26s. 6d. to 27s. per cwt.

General Notes.

TO MAKE A MUSTARD PLASTER.

The ordinary way of mixing mustard with water, tempering it with a little flour for a plaster, is abominable. No water should be used, but mix the mustard with the white of an egg, and the result will be a plaster which will draw perfectly, but will not produce a blister.

BRISBANE WOOL SALES.

It has been decided that the first Brisbane wool sale for the season 1900-1901 is to be held in the last week of October, as by that time it is hoped that the condition of the wool market will have recovered itself from the disturbed state in which it has been during the past few months. The London sales open on the 9th of October. The Government bonus is payable on all wool sold before the 30th June next.

BAKED WEEVIL.

A Continental experimentalist records results obtained in killing insects among seeds by the application of heat. Weevils were dead after two minutes' exposure at a temperature of 122 degrees, and many other insects at 140 degrees. The indications are that this treatment will also destroy the eggs of insects and the spores of fungi, experiments being now in progress to determine these points. The remarkable point about the experiments is the great resistance to dry heat shown by most seeds. It was found that the cereals, excepting maize, withstood a temperature equal to the boiling point of water for an hour without their germinating power being in the least affected. The conclusions drawn are that by short exposures to these high temperatures all animal and vegetable parasites may be destroyed without injury to the seeds. Local experiments in this direction should be made. Even if the germinating power of wheat or maize were destroyed without other injury to the grain, something practical might result. Everyone has seen American kiln-dried maize.

TO COOL A ROOM.

We have somewhere read lately that if you wish to cool a room all that is necessary is to hang up a large wet cloth in some part of the apartment, when, if the ventilation be good, the temperature will sink 10 or 15 degrees in less than an hour. The experiment is worth trying during our hot summer days and nights.

CUTTING UP ONIONS.

The pungent odour arising from onions when being peeled greatly affects the delicate membranes surrounding the eyes. An American exchange says the odour is due to a sulphurous oil, which volatilises rapidly when the tissue of the vegetable is broken in any way. To avoid the effects of this vapour is easy if a small pared potato be stuck on the end of the knife with which the cutting is done. A chemical affinity, which cannot readily be explained, but which is none the less satisfactory in its workings, attracts the fumes, and their presence is not manifested to the operator till the potato has reached a certain degree of saturation, when it can readily be replaced by another.

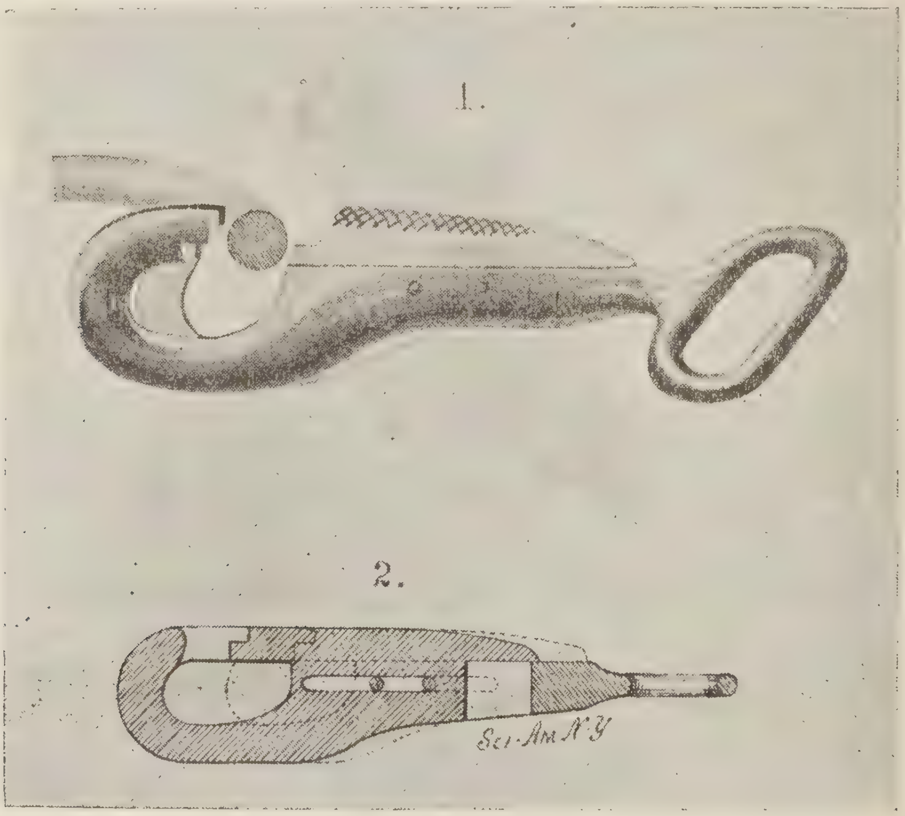
Onions are amongst the finest nerve tonics we have; and if spring onions are chopped and spread between slices of bread and butter, they form a sandwich which, if eaten at supper-time, will do a good deal towards ensuring a good night's sleep. Plenty of onions should be found in a spring salad.

The unpleasant odour imparted to the breath by eating onions can be neutralised by eating a little parsley.

A SPRINGLESS HARNESS SNAP-HOOK.

A snap-hook made without springs, and therefore more certain in its action than most similar devices, forms the subject of our engraving.

The hook comprises a main portion and a keeper. The main portion has a hook projected from the shank and a longitudinal slot extending into and through the shank. The keeper consists of a thumb-plate with a plain under surface lying snugly on the plain top-face of the main portion, the front end of the thumb-plate being projected in position to engage the point of the hook so as to close the latter. On the under face of the thumb-plate is a longitudinal web lying friction-tight in the slot of the main portion. The keeper is slidably mounted on a pin extending through a slot in the web (Fig. 2). In using the



hook, the keeper is moved to the position indicated by dotted lines in Fig. 2, and the eye or ring which is to be engaged is dropped into the hook of the web below the point of the hook in the main portion. Strain is then placed on the hook, so that the keeper and its web are made to move to the position shown in full lines in Fig. 2, thus preventing the disengagement of the snap-hook from the eye or ring of the harness with which it is connected. Since the keeper is friction-tight on the body of the snap-hook, it cannot move accidentally to open the hook. Moreover, the strain of the harness will cause the keeper to remain in closed position. To open the hook, it is only necessary to push the thumb-plate back, to move the parts to the position shown by the dotted lines. The device is the invention of James A. Gavitt, Waitsburg, Washington.—*Scientific American.*

CLEANING THE PLOUGH.

A good plan for cleaning the plough, which will also work well on other tools of iron or steel, is as follows:—Slowly add 1 pint of sulphuric acid to 1 quart of water, handling it carefully and stirring slowly, as considerable heat will result from the mixing. When cool, moisten the surface of the metal with this, and then rub dry, after which wash off with pure water. This application should clean any surface not too badly rusted, but if the tool has been long neglected it may require more than one application. After cleaning, a thorough coating of grease is given before putting a tool away, and when taken out to use give another greasing, and it will go one horse easier. Not only is it much easier for team, but ploughman also.—*Journal of Agriculture of Western Australia.*

PREVENTION OF WEEVILS IN SKINS.

Morehead Limited publish the following recipe with their last report, which should interest the kangaroo-shooter:—Solution of Arsenic for the Prevention of "Weevil" in Skins.—To make: Mix 5 lb. arsenic and 6 lb. soda in 10 gallons of water; boil slowly for about half-an-hour, and when the mixture rises dilute with twice the quantity of cold water. Apply with a brush to the fleshy side as soon after flaying as possible.

A TEN PER CENT. GRADE.

A 10 per cent. grade means a rise (or fall) of 10 units of length in a distance of 100 of the same units of length, the rise (or fall) being measured vertically, and the distance horizontally. If the unit of length is 1 foot, a 10 per cent. grade means a rise (or fall) of 10 feet in 100 feet; in the same way it may mean a rise (or fall) of 10 rods in 100 rods, or 10 miles in 100 miles. A 10 per cent. grade in feet to the mile would be a vertical rise (or fall) of 528 feet in each mile of horizontal distance.

A STRONG CEMENT.

Common alum melted in an iron spoon over hot coals forms a very strong cement for joining glass and metal together. It is the best thing for holding glass lamps to their stands, or for stopping cracks about their bases, as kerosene does not penetrate it.

THE MAFFRA BEET SUGAR FACTORY.

The Victorian Government has formulated a scheme for carrying on the beet sugar industry in the Maffra district during the present season. By this scheme, farmers are invited to grow beet in small areas of half-an-acre, and a bonus of £2 per ton will be given by the Government, in addition to which the farmers will receive a bonus at the end of the sugar season. The experiments are to be placed under the direction of the agricultural chemist, Mr. A. U. Pearson, who will be assisted by Mr. F. E. Lee as local agricultural superintendent. Already, we learn from the *Australasian*, some thirty farmers have readily responded, and have signified their willingness to Mr. Lee to grow the necessary area, and it is anticipated that this number will easily be increased to forty or fifty. The seed is being distributed free of charge, the use of sowing-machines is also granted, and any farmer wishing to sow more than the half-acre will be supplied with free seed. A good start has already been made with the preparation of the land, and the first sowing was to commence on 30th August, that being the same date on which the experiments conducted last year by Mr. Van de Velde commenced. Mr. Pearson is also having an acre and a-half prepared at the factory, and experiments of all kinds with manures, different spacings of the rows and plants, will be carried on by Mr. Lee.

THE GERMAN PROHIBITION OF OUR MEAT.

The Germans are good colonists all the time, and they do not agree with the new legislation in Germany, which will prevent us sending our canned meat there. During the month a number of leading Germans in Brisbane held a meeting, and amongst those present were—Messrs. Rost (Rost, Sterling, and Co.), G. Muller (Muller and Woolfrey), Phillippi, Sachs (Sachs and Co.), C. Angel, Pastor Maier, Pastor Becker, Kelbe (*Deutscher Australische Post*), Monsel and Lischke (*Queensland Herald*), Puttlitz (*Nord Australische Zeitung*), and many others.

Dr. E. Hirschfield took the chair, and made a ripping speech, pointing out that during the last two years Queensland has sent 85,000 cases of tinned meat to Germany, and objecting, in the interest of both parties, to the trade being squashed. Then they passed the following resolution :—"That this meeting is of opinion that the Germans in Queensland should take steps to remove the restriction imposed by the recent legislation in Germany against the importation of canned meats." Then they formed a committee, and forked out £12 on the spot, to start a fund to enable them to shake up the Germans all over the colony, and get signatures, and then send a petition to the Emperor, or to his Government. The German in Queensland is all right.—*Queensland Grazier*.

A CORRECTION.

In our report of the exhibits of the Logan district at Bowen Park in August last, which we extracted from the *Brisbane Courier*, an error occurs, which we take the first opportunity of correcting. The exhibit of chicory was credited to Mr. Bloom, who exhibited locally made chains. The chicory was grown and prepared by Messrs. S. and G. Grimes.

AGRICULTURAL AND HORTICULTURAL SHOWS.

The Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respectiwe shows, notify him of the date, and also of any change in date which may be decided on.

Answers to Correspondents.

The best book from which to learn how to grow sugar-cane is—practical experience. Books are useful aids to any rural industry, but conditions vary so much in different districts that we advise our correspondent not to trouble about bookwork until he has worked for twelve months with a cane-farmer in his district, especially as he describes himself as an "intending" settler.

The Markets.

AVERAGE TOP PRICES FOR AUGUST.

Article.		August. Top Prices. £ s. d.
Bacon	lb.	0 0 6⅞
Bran	ton	5 16 10½
Butter, First	lb.	0 1 0¼
Butter, Second	"	0 0 7⅝
Chaff, Mixed	ton	3 11 3
Chaff, Oaten	"	4 11 3
Chaff, Lucerne	"	3 17 6
Chaff, Wheaten	"	2 8 9
Cheese	lb.	0 0 7
Flour	ton	8 17 6
Hay, Oaten	"	4 0 0
Hay, Lucerne	"	2 12 6
Honey	lb.	0 0 1½
Rice, Japan (Bond)	ton	16 10 0
Maize	bush.	0 3 3⅝
Oats	"	0 3 5¼
Pollard	ton	5 15 0
Potatoes	"	4 1 3
Potatoes, Sweet	"	1 15 7½
Pumpkins	"	1 8 9
Sugar, White	"	17 2 6
Sugar, Yellow	"	13 7 6
Sugar, Ration	"	10 7 6
Wheat	bush.	0 3 5¼
Onions	cwt.	0 7 11¼
Hams	lb.	0 0 9½
Eggs	doz.	0 0 6½
Fowls	pair	0 3 9¾
Geese	"	0 5 0
Ducks, English	"	0 4 0
Ducks, Muscovy	"	0 5 0¾
Turkeys, Hens	"	0 7 3
Turkeys, Gobblers	"	0 14 1½

ENOGGERA SALES.

Article.	August. Top Prices. £ s. d.
Bullocks	9 10 7½
Cows	7 3 1½
Wethers, Merino	0 16 8¼
Ewes, Merino	0 11 3
Wethers, C.B.	0 15 10½
Ewes, C.B.	0 14 8¼
Lambs	0 13 6
Baconers	1 6 0
Porkers	1 2 6
Slips	0 8 0

Farm and Garden Notes.

Kitchen Garden.—The question is frequently put to us: "What vegetables can I grow during the hot Queensland summer?" A farmer, or an amateur, says he will grow vegetables; and as the late excellent horticulturist at the Queensland Agricultural College, Mr. H. W. Gorrie, once wrote in this *Journal.* "The careful husbandman saith unto himself, 'Lo! I will plant vegetables for the summer.'" And he straightway goeth and planteth pumpkins. This is really what often happens. Sometimes cabbages are planted, but, as a rule, all is pumpkin. Now, we will just ask our readers to take up Part 6, Vol. VI. (June, 1900), of this *Journal*, and read, mark, learn, and inwardly digest, forthwith putting into practice what we then wrote of our market-gardening operations. There the man who proposes to grow summer vegetables will find most of the suitable kinds named, with the dates of sowing, planting out, and gathering. To this we will add the late Mr. Gorrie's advice.

There are many good, wholesome vegetables which can be grown during the hot weather, and they are just as easy to grow as the eternal pumpkin and cabbage.

Now is the time to sow beans of many varieties.

French or *Kidney Beans* may be sown in all parts of the colony.

Lima Beans love hot weather, and will yield heavy crops of a most excellent vegetable. Sow the dwarf kinds in drills 3 feet apart and 18 inches between the hills, and the climbers 6 feet each way.

Beetroot is not too late; whilst cucumbers, marrows, squashes, and melons should be sown at once where not already in the ground. If leaf-eating beetles attack them, spray with Paris green or London purple.

Peas will do well in cool districts; *Egg plant* should be set out in rows 4 feet apart. Plant out tomatoes 3½ feet each way, and see that they are trained to a single stem, and trained through wire-netting. Set out *rosellas.* There are a few more small vegetables which will repay careful summer cultivation. Mustard and cress, spinach, lettuce, vegetable marrows, custard marrows, parsnips, carrots, eschallots, and cabbage will also respond to shade, water, and manure.

Keep the hoe and cultivator going, as weeds will soon be growing apace. When watering, do so early in the morning or late in the afternoon, and always stir the soil next day to keep it from baking. Remember that mulching is always of benefit during the hot months.

NOVEMBER WORK.

As many of our readers do not receive the *Journal* in time to benefit by these notes during the month of issue, we propose in future to publish them two months ahead.

The Kitchen Garden in November should be found well trenched, because shallow-worked land will not repay the labour expended on it. During this month give plenty of room, both in sowing and transplanting, or the crops will be drawn and worthless. Thin out the melon and cucumber plants. Water and mulch the tomatoes planted out in October. Sow cabbage, French beans, melons, lettuce, radish, pumpkins, cucumbers, rosellas, &c., and transplant for a succession in calm, cloudy weather.

THE FIELD IN OCTOBER.

Showers may now be expected, and the weeds will be on the increase. Needless to tell the observant farmer that the horse-hoe and cultivator must be kept going constantly. Do not let the weeds get ahead of you, or the old proverb that "one year's seeding means seven year's weeding" will prove a true one. Earth up the growing crops, and keep the ground loose among them. Plant sweet potatoes, yams, earth-nuts, arrowroot, turmeric, ginger; sow maize, sorghum, setaria, imphee, and Kafir corn; also sow and plant out tobacco.

THE FIELD IN NOVEMBER.

As during last month, be careful to keep down the weeds. They rob the soil and harbour plant pests. Under favourable circumstances harvesting may be begun in some districts. Oats should be cut for hay when mature, but not ripe, as the plant is then in its most nourishing condition. Destroy the caterpillars which will now be numerous on tobacco plants, and top the plants back so as to throw all the strength into the leaves intended for crop. Sow imphee setaria (or panicum), teosinte, sorghum, maize, Kafir corn, &c.; in fact, sow much as directed for last month.

OCTOBER.

The Flower Garden.—Plant chrysanthemums, and see that they do not want for water; also look out for aphis and caterpillar. The garden will now be commencing to show the result of the care bestowed upon it during the past two months. It is a good time to plant out palms and all kinds of tropical and semi-tropical plants. If the weather is very hot after planting, water and shade the plants. Dianthus, snapdragon, coleus, tuberose, crinum, gladolius, and other bulbs may be planted. Do as much of the work now as is possible, and do it on dull, showery days. The principal work in the garden after this will be raking and stirring of the beds, staking, shading, and watering. Roses should be in full bloom now. Keep them free from aphis, and cut off all spent flowers.

NOVEMBER.

Dahlias are well above ground in many gardens, and should be staked. Bulbs which were put away in a moist spot may now be planted out. The winter flowering plants and the many varieties of gay annuals are passing away rapidly. Replace these by sowing balsam, zinnia, *Gomphrena globosa*, summer asters, summer chrysanthemum, calliopsis, amaranthus, nemophila, antirrhinum, &c. Do not forget to keep up the beauty of the garden by the help of a little judicious fertilising by way of top-dressing.

Pot plants on verandas will require attention in the matter of watering. Mr. Mac Mahon, Curator of the Brisbane Botanic Gardens, recommends plunging the pots into neat boxes of fine ashes during the hot weather. The plants would flourish better, and there would not be the same need for continual watering.

Orchard Notes for October.

By ALBERT H BENSON.

Keep the land well cultivated, and, if dry, see that it is well stirred, but not turned. Attend to the disbudding of all young trees, for, if superfluous growths are checked now, they are converted into fruit-wood, and the vigour of the tree is thrown into those shoots which are to form the future branches of the tree. Disbud all vines, rubbing out all superfluous shoots, leaving only as many canes as the vine is strong enough to mature fruit to perfection on.

Sulphur all vines to prevent oïdium, as, if there is any muggy weather during the month, this disease is sure to make its appearance. Where Black-spot is present, spray the vines with Bordeaux mixture; and if caterpillars are troublesome as well, then add 1 oz. of Paris green to each 2 gallons of Bordeaux mixture, and both pests will be destroyed by the one spraying. When using Bordeaux mixture, there is no necessity to use sulphur for oïdium, as the Bordeaux mixture answers equally as well. Don't spray when the vines are in blossom; but with varieties that are shy setters it is often a good plan to sulphur when in blossom.

The nursery should be carefully attended to; where not already done, the ties of all grafts should be cut and the scions should be trained so as to make a single upright stem. Where buds have been put in, they should be started by cutting back the stock sufficiently to cause them to grow, but the stock should not be cut hard back all at once, but by degrees, always leaving a portion of the stock above the bud to tie the young shoot to. Plant pines and bananas during the month, selecting suckers from healthy plants and from plants that are good croppers, and that produce good fruit, as a careful selection of suckers always pays well. Continue the treatment for Maori or Rust Mite of the orange recommended in the Notes for September; and where orange bugs, either the green or bronze, are present, destroy every mature insect that can be found, so as to prevent them breeding, as the killing off of the first crop will materially lessen their number for the season. Hand-picking, though slow, is probably the best remedy, though, before the insects are fully grown, large numbers may be destroyed by driving them on to the main branches of the tree and sweeping them off with a broom on to a cloth, from which they can be gathered and killed. Take every possible precaution against the fruit fly by destroying every infested fruit that you can. If there are maggots in cumquats or any other fruits, destroy every one, as the cleaner the sweep that is made of the first crop of flies the less trouble there will be throughout the season. Where Scale Insects have been introduced on young trees into clean districts, every care should be taken to keep the pest from spreading; and in cases where the young trees are badly affected, it will pay the grower to destroy them at once, as the first loss will be the least. Where leaf-eating insects of any kind are troublesome—such as caterpillars of kinds, the larvæ of the fig beetles, or the false ladybirds that attack all kinds of cucurbitous plants, potatoes, &c.—they can be readily destroyed by a spraying of Paris green, 1 oz. to 10 gallons of water, with lime added in as large a quantity as can be got through the nozzle of the pump without choking, as this will tend to make the poison stick on better to the leaves, branches, or fruit.

Results of Dipping Tests.*

By P. R. GORDON,
Chief Inspector of Stock.

I have the honour to submit the following progress report on experiments authorised by the Minister on the 27th October last, and carried out in the hope of discovering a dipping material that would destroy all tick life on cattle. In consequence of the difficulty of obtaining tick-infested cattle, the experiments have been suspended for the present.

The principal object aimed at was to ascertain whether, immediately after one or two dippings, cattle might, without risk of spreading ticks, be taken from infested to clean country.

By the courtesy of the Tantitha Co-operative Dip Company, the use of their dip, free of charge, was granted, until the construction of a dip at the Indooroopilly Experimental Grounds could be completed. Tick-infested cattle were readily available there, and the experiments at that place were placed in charge of Mr. E. B. Maclean, who was known as a careful observer, and who had large experience of ticks in the North.

The mixture known as "Christian's Dip," as being the most effective known up to date, was first tested at Tantitha. The formula for this dip, as recommended by Dr. Hunt, was used, namely: 10 lb. arsenic, 28 lb. soda, 5 lb. soap, and 7½ gallons Stockholm tar, to 400 gallons water. The arsenic, soda, and soap are boiled together in a small quantity of water, then the tar added, then the bulk of cold water. Some few owners boil the whole of the liquid in the dip, and by that means the whole of the tar is made miscible.

On 3rd February last, three head of badly tick-infested cattle, purchased for the experiment, were dipped a first time in the above mixture, and, at the same time, nine grossly infested cattle belonging to a dairyman in the neighbourhood were dipped and turned back on their pasture, with the object of ascertaining how long the cattle would remain free from reinfestment.

The cattle were seen and closely examined daily. On 4th, some live and a number of dead ticks were found on them. On 5th, a few live ticks still found. On 6th, fourteen live half-grown ticks were found on some of the cattle. On 7th, no live ticks found on any of the cattle. All live ticks taken off them prior to 6th were dead at this date. On 8th, the cattle were still a little stiff from the effects of the dip, but apparently free from ticks.

On 12th, however, Mr. Maclean found one live half-grown tick on one of the cattle—*i.e.*, nine days after dipping.

On the 14th, the three first-dipped cattle were dipped a second time in the same mixture, and immediately afterwards trucked to Brisbane, where they were placed, under the care of the Metropolitan Inspector, in a clean paddock, and examined every other day, either by him or his assistant. These cattle remained free from tick infestment.

On the same date, 14th February, three cattle, badly infested with immature ticks, were dipped at same place, and in the same mixture, and on the two succeeding days live ticks were found on them.

On the 16th, they were trucked to a clean paddock, and on 17th were closely examined by Mr. Maclean and Inspector Hancock, without finding any live ticks on them. However, early in April several ticks were found on them, and they were successfully disinfected.

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* Received too late for classification.—Ed. *Q.A.J.*

Thus, it will be seen that whilst those that underwent two dippings, at an interval of eleven days, remained free from ticks, when placed on clean pasture, those that were only dipped once became reinfested, or, more properly, were not effectually cleansed. Some ticks taken from those cattle were given to Mr. Pound, who reported, on 10th April, that they deposited their ova, and the latter duly hatched in the laboratory.

The failure of the one dipping is seemingly to be accounted for by the fact that, prior to the first moult, the larval tick is, to a large extent, protected from the effects of the medicaments by an encrustation or shield; and, as the first moult is said to occupy a week, it follows that a second dipping, in from ten to twelve days, is necessary to cleanse the cattle of all ticks.

Regarding the nine cattle that were dipped on 3rd February, and turned back on their tick-infested pasture, no live ticks were found on them after the second day, but on the 18th day after dipping they were found to be badly infested with small ticks, and on the 24th day after dipping fully developed ticks were found on them, so that they must have become reinfested in less than a week after dipping.

The next experiment conducted at the Tantitha Dip was with the ingredients of Christian's Dip, *minus* the arsenic. This was to test an opinion held by some, and in which I at that time concurred, that arsenic was not an essential in the dip. Two calves were dipped in this mixture, first on the 23rd February, and a second time on 6th March. These were trucked to Brisbane, and placed, in charge of the Metropolitan Inspector, in an isolated loose box in the suburbs.

Of this dipping, it need only be stated that it proved a failure, showing that the arsenic is the principal destructive element in what is known as "Christian's Dip," and in future experiments to be referred to this opinion was fully corroborated. It may be mentioned, however, that when the dip contained no arsenic the dipped cattle did not suffer from stiffness, as was the case when arsenic was present.

The last experiment made at Tantitha Dip was with Messrs. Morris, Little, and Sons' Poisonous Dip. As this dip was tested at Brisbane, under the superintendence of the company's agent, details need not be given here further than to state that Mr. Maclean reported that he had found Christian's Dip more effective.

EXPERIMENTAL DIP, INDOOROOPILLY.

With the concurrence of the Minister, a dipping vat, having a capacity of 2,000 gallons, was constructed on the Indooroopilly grounds in order to test the many proprietary dips being offered to the Department. The conditions laid down were that if the proprietors of the specifics charged the dip, free of cost, we would find the cattle and labour for the tests.

The first test conducted at this dip was on 22nd March, with Little's *Poisonous* Dip, the Australian agent, Mr. F. G. Dombrain, having travelled from Melbourne to personally conduct the test. The dip was made up of 1 part of the fluid to 80 parts of water. Six tick-infested animals were put through the dip, the time occupied in passing through being from 5 to 9 seconds, actually floating. Four hours after dipping, the quarantine keeper found all the fully developed ticks shrivelled up. He collected numbers of them, and they, along with large numbers of larval ticks, were shown to me, next morning, all dead. He examined them carefully for seven days, at the end of which time they were free from ticks, but became reinfested with larval ticks on 10th April, nineteen days after having been dipped. In this test, a man was stationed about midway between the ingress and egress of the dip who, by means of a crutch, plunged the head and body of each animal under, as it swam for the exit. It is worthy of note that one of the cattle—No. 7—jumped from the stage into the bath, and its head and top of shoulder were not immersed. It was also missed by the man in charge of the crutch. On the morning after dipping, the

quarantine keeper collected ten ticks off the wither of this animal, and placed them in a bottle. Four of these ultimately laid eggs. As it happened, this *contretemps* afforded a valuable lesson in dipping, showing the necessity for providing a means of checking the exit of cattle that had not been thoroughly immersed.

On the same day we immersed some young tick-infested cattle in a dip of the ordinary Little's Fluid, at a strength of 1 of the fluid to 40 parts of water, keeping them for nearly a minute in the bath ; but the results of that experiment were most disappointing. So far as could be seen, none of the ticks had been destroyed.

These two experiments emphasised what I have stated above : That arsenic would appear to be the one tick-destroying agent in the only effective dips with which, up to the present, we are acquainted.

While on the subject of Little's Poisonous Dip, this—although out of the sequential order in which the experiments were carried out—appears the proper place to notice two other experiments carried out with this dip.

On 26th June last, I passed a heifer and steer through the Poisonous Dip at the strength recommended by the agents—*i.e.*, 1 of the fluid to 80 of water—but kept the steer thirty seconds and the heifer seventy-three seconds immersed in the bath, the time being carefully taken by Mr. Orr, the chief clerk. Both animals were miserably poor, the steer being greatly emaciated, and the skin sloughing and desquamating from excessive tick infestment. Portions of the skin of the heifer were also desquamating. Mr. Haly, the Assistant Metropolitan Inspector, daily visited and closely examined the animals for four days. A few fully developed female ticks were found on the animals on 27th and 28th. One of those taken on the latter date eventually laid some eggs, but all died, and the eggs have not hatched. A very few larval ticks were found on the cattle up to the 30th June.

On the 3rd of July, I dipped two tick-infested cattle in the same (Poisonous) fluid, but at a strength of 1 part of the fluid to 60 of water. These cattle were closely examined daily for some time ; but after the dipping no live ticks, either larval or matured, were ever found on them, and it was noticed that among the dead ticks found were many that had not passed the first moult. The dipping in this instance was most effective. Both these cattle were in very poor condition, and the skin was sloughing inside of the hind legs of one, and on the shoulder of the other. The only inconvenience caused by the dip was that one of them moved about somewhat stiffly for a few days. All the dipped cattle continued to improve after dipping.

On the 2nd April, twenty cattle (five belonging to the Department and fifteen belonging to a dairyman in the immediate neighbourhood) were dipped in a solution of what is known to the trade as "Hide Poison." Five of the animals were examined in a crush five hours after dipping. A number of the mature ticks had dropped off, but no dead ticks were found on the cattle. Those picked off the cattle up to the 3rd all laid eggs, and some taken from the cattle up to the 6th laid eggs, while the majority were dead.

On the 14th June a dip was prepared composed of a strong extract of tobacco, and 40 lb. of sulphur to 200 gallons of water heated to 110 degrees Fahr. One animal was kept in this mixture thirty and another for sixty seconds. This experiment may be disposed of by stating that not a single dead tick was found on either of the animals after the dipping. All mature ticks taken from them laid eggs. The hair was thoroughly peppered with sulphur, but that did not appear to infect the ticks in any way.

On 13th August, twenty-two cattle were put through a dip known as Quibell's Dip, the dipping being under the personal supervision of Mr. A. E. Royle, the agent of the proprietary. Ten of these belonged to the Department, and the time occupied in passing through the dip was from five to nine seconds,

actually swimming. The ten belonging to the Department were dipped at a strength of 1 part of the dip to 60 of water, and the remaining twelve were dipped at a strength of 1 to 80, and were kept in the dip for fully one minute. None of these cattle were heavily infested. This dip did not visibly injure the cattle in any way. The cattle were under daily observation, and live ticks found on them for several days after dipping, but on close inspection on 23rd, ten days after dipping, no live ticks were found on them.

Several experiments were made by immersing ticks of various stages of growth in solutions submitted for test, but in each case it was found that, as Dr. Hunt had reported, these tests afford no precise criterion as to the effect they will have when applied as a dip.

It is a common experience that ticks immersed in solutions that have been found the most effective in a dip survive and deposit eggs when immersed for a time even in excess of that occupied by cattle in passing through a dip. This is but a repetition of our past experience in dipping for the cure of sheep scab.

Agriculture.

FIELD AND GARDEN REMINDER FOR NOVEMBER.

By HENRY A. TARDENT,
Manager of the Biggenden Experimental Farm.

Having been asked to write monthly reminders for field and garden work, it goes without saying that I accede willingly to the request, although I am well aware of the difficulties attached to the task. First, the work, to be well done, requires much more time and care than I can devote to it. Then there is the extraordinary diversity of zones, seasons, and climate in our colony, which is as large as two or three of the largest European empires. Then there are many farmers who do not require any reminders at all, as they know already all about seasons, crops, time of sowing, &c. Of course, it is not for those that we write. But the fact remains that in these colonies many embark in farming without previous experience. Those I found always much eager for information, and not seldom they turn out capital farmers, after a few years of struggle. Others come from the old country or foreign lands. They are at first somewhat bewildered when they find that at noon the sun is here due north, and that our summer displays its splendour during December, January, and February, which in their native countries are always associated with sharp frosts and snow. Many a crop has to be treated differently here than in the old country. Other crops are entirely new. Soils even differ. A soil reputed good in a climate with a regular rainfall and moisture may not be suitable here, where we have often an excess of rain or an excess of dry weather. All those problems, and many others, will be treated in turn as opportunities will arise. As I go along I shall also answer many questions of general interest which I receive daily from farmers residing in places scattered throughout the width and breadth of the colony. I shall always be glad and thankful for any fair criticism, suggestions, and . . . reminders of omissions or errors. It is by such a constant interchange of ideas that we can expect to advance our noble profession and thus contribute our modest share towards the prosperity of our country.

It is, of course, well understood that these notes will prevent no one from thinking for himself and exercising his own judgment. They are written from Biggenden, on the western slope of the Wide Bay and Burnett districts, to which they are more immediately adaptable. On the lowest and in the warmer parts of the colony the seasons are in advance. In the colder parts the work will often have to be deferred for a whole month.

The present spring has been an exceptionally good one for the greater part of the colony. As a rule spring months are relatively dry, but this year nice warm soaking rains have obtained at fairly regular intervals. This has ensured a nice spring in the grass, and has been a great boon to those farmers who had their land ploughed in advance during the winter months. But it has rather hampered those who had to do their ploughing in the spring. As soon as the land was getting dry here, there came on a shower which delayed the work for another week. We might take it as a rule that it pays to be always in advance with one's work. Advantage can then be taken of any fine spell in the weather for putting in crops.

During the whole of the month sowing can be made of the following:—Maize, sorghums, millets, especially setaria which gives a beautiful crop in from ten to twelve weeks, pumpkins, marrows, squashes, rock and water melons, cattle or jam melons, cucumbers, tomatoes, egg plants, chillies, Jerusalem and globe artichokes, mangel wurzels, sugar and red beets, also Swiss chard. The latter, called by some silver beet, is a good vegetable, easily grown, and standing dry weather well. The green part of the leaves forms a very good dish after being first boiled,

then chopped fine, and fried in butter with a little sprinkling of flour added to increase the consistency. This dish, which is usually served with hard boiled eggs cut in halves, is both pleasant to the palate and conducive to good health. Its seakale-like ribs are also very wholesome when boiled in salt water. They are sucked like asparagus and the fibrous part is rejected as useless. No plant is more suitable for keeping up a constant supply of green food for the fowls and pigs. Every week the lower leaves can be broken off, and will be replaced by new ones growing from the centre or heart of the plant.

The New Zealand spinach is also a capital vegetable, which stands both heat and dry weather well, and should be grown in every garden. Plant 4 feet apart each way, as it trails on the ground and spreads very rapidly. Of cabbages, the Succession, the Cannonball, and especially the St. John's Day, are those which stand best our hot summer weather. Of course, in that season they always grow somewhat leathery, and are never as tender and crisp as in winter, even when irrigation can be resorted to.

Of radishes, the best for the season are French Breakfast, White Celestial, and especially the Black Spanish; the latter, which grows to a very large size, has a nice, hot, appetising taste which reminds one of the horse radish. It is very hardy and profitable.

Where water cannot be used, French and other European beans are a risky crop, likely to dry up in case of slightly protracted dry weather. They should be superseded by Lima beans, either the King of the Garden (climbing) or the Burpees Dwarf, which grows on small erect bushes. Both are very prolific, and will keep the household in unsurpassed vegetables all through the summer. Those two varieties are a very profitable crop, and should be grown here extensively as a commercial crop, as in California and other American States.

Good results will also be obtained from Sugar, the Mungo, and the Snake or long Chinese beans. None, however, will yield a surer and more prolific crop than the different varieties of the so-called cow pea or *Vigna Catiang*. When planted early, they will furnish all through the summer green pods as good as the more delicate French beans. The dry beans are second to none for eating boiled with corned beef, pork, or mutton. In the field they will be found just the thing to grow as a catch crop between two crops of wheat or other exhausting plants. They will not only keep the land free from weeds and friable, but enrich it with a large supply of nitrogen; they will fill the barn with a capital chaff for the horses and cattle, and give, in addition, a welcome crop of beans now in great demand all over the North to sow on the exhausted sugar land; but at any time cow peas are invaluable on the farm as a food for man, horses, pigs, and fowls.

Every farmer should, of course, keep a few head of choicest cattle as a basis to his farming, and supplement the natural grasses with a patch of artificial pastures. Let everyone give a trial to the now famous *Paspalum dilatatum*. It can be grown from seed, but the best way to propagate it is to transplant roots from 3 to 4 feet apart each way. For a short time the whole field will be covered with a dense forage greatly relished by all farm animals. It will come handy to keep up both condition and milk when the natural grasses begin to wither away.

It goes without saying that both in the field and in the garden an incessant war must be waged with weeds and the caking of the land. Those who have not made comparative experiments, cannot fully realise the extraordinary benefit to be derived from good tillage. Whilst corn and cow pea are from 4 to 6 inches high, they can be gone over with light harrows, especially the Lever Ajax, with the teeth slightly bent backwards. The operation does them an incalculable amount of good. Later on the Planet Junr., or any other efficient scarifier, must be kept constantly going, especially after rain. Ten well-kept acres will be much more profitable than twenty of indifferently worked land. Remember as a golden rule the wise old English proverb: "The crop will show how the field was tilled."

Plate XLVIII

A TYPICAL BUSHHOUSE.

QUEENSLAND SETTLERS AND FARMERS' HOMES.

By FRED. W. PEEK, Loganholme.

Part III.

THE FLOWER AND FRUIT GARDEN.

Queensland has been properly named "The Land of Sun and Light"; these being two of the principal factors in the successful culture of flowers and fruit, and in our varied climate almost any known variety can, at certain seasons, be grown most successfully if only care be taken in making judicious selection and planting at the right season.

The true delight of a "farm home" in this colony lies, not so much in the size, shape, or convenience of the residence or buildings which may be attached thereto, as in the surroundings. I know of nothing more pleasant than a neat and well laid out garden for fruits and flowers, with neat and cleanly kept paths round the beds and plots of parti-coloured flowers and sweet-smelling blooms, not only pleasant to the senses, but a source of profit in ways which I shall describe hereafter.

In many ways flower culture is worked on the same lines as horticulture generally, with the exception, perhaps, that finer tilth is necessary in the preparation of the borders and beds laid out for annuals. But the same general rule applies as to breaking up the land, drainage, &c., as given and illustrated in my article published in the September number of this *Journal*.

The great secret of success in floriculture is a perfect knowledge of the seasons. Some seeds will only germinate in cool weather, when the natural heat in the soil is low—others will only germinate with heat; and these latter require either an artificial heat, produced by a hot bed or in a glass house, or else we have to wait till the natural heat of the tropical sun has the desired effect. Much can be accomplished by means of a bushhouse, or artificial shade-house, and anyone who has visited the Botanic Gardens in Brisbane, or in other towns where such shade is provided, will be pleasantly surprised at the splendid effect produced by the growth and variety of plant life shown—comprising ferns and orchids, begonias, crotons, caladiums, gloxinias, coleus, cinerarias, &c., in their varied and brilliant colours, intermingled with the green foliage of native scrub plants and climbers, the stately tree ferns, and the modest maidenhair, all tending to present a picture both interesting and beautiful. Such an effect can be produced on a smaller scale, if desired, with very little trouble and expense, by our native plants, unsurpassed even in the best-ordered conservatories of England. A bushhouse, with its cool shade, offers a calm retreat in the hottest of days, and provides for those settlers and farmers who will take the necessary small amount of trouble a constant source of enjoyment for both body and mind. By all means have a bushhouse in connection with the farm home.

WHAT TO PLANT, AND WHEN TO PLANT.

In laying out the grounds and marking off the seed beds and flower-plots, as well as the position of the various shrubs and fruit trees, a little thought and care are required to avoid an over-crowded appearance in the near future. I would advise that before planting the land be allowed to remain for quite a month after being broken up, to ærate and sweeten. I would like to give a word of advice here on the selection of seeds. I have often heard complaints from farmers and gardeners that the seeds and plants they have purchased from so-called nurserymen and seedsmen have turned out no good—as the seeds would not germinate, and the fruit trees have been worked, and grafted on stocks of any description except those suitable for grafting operations. On inquiring into one or two complaints of this description, I found that seeds and plants had been purchased from peripatetic agents or

hawkers, and in some cases from auction marts; the vendor not knowing or caring what the after results were, so long as the goods left his hands at a profit. All this can be avoided if horticulturists placed their orders with reliable seedsmen and nurserymen, of whom there are many in every town in Queensland. If it is found difficult to procure any particularly needed plant from local storekeepers, then an order sent by post to one of the firms of seedsmen in Brisbane will be carefully attended to, and tested suitable seeds will be forwarded by post without delay.

TO TEST SEEDS.

If there should be any doubt as to the quality of seeds, such as lucerne, clover, carrots, cabbage, onions, and, in fact, almost any seeds, they can be tested very easily in the following manner:—Take two pieces of flannel or blanket, say about 3 or 4 inches square, enough to cover the upper surface of a saucer, moisten the flannel in water, and spread one piece on the saucer; over this sprinkle a small pinch of the seed it is desired to test; then cover with the second piece of flannel. Place the saucer in a warm place, taking care that the flannel does not get dry at any time; but do not let water stand in the saucer. Always pour off any surplus water after wetting the flannel. It will be found that seeds will germinate in a few days under this treatment, and thus prove their value.

Flowering plants which can be grown from seed are divided into three classes:—

1st. *Hardy Annuals.*—These comprise those that can be sown in the open without the trouble of transplanting, the seed being sown in lines or patches as desired. Some care is necessary to avoid covering the seed too deep, a very slight covering by sifting a little light loam or wood ashes over it being sufficient.

2nd. *Half-hardy Annuals.*—Many of this class of plants are better for being raised in shallow pans, pots, or boxes, and transplamted into the open ground at suitable times. The soil in the pots or boxes should be well soaked, and left for an hour to drain before planting the seed.

3rd. *Biennials and Perennials.*—This class of plants requires most care and attention, being raised as above in pots or boxes and flowered in pots. It includes some of the most beautiful of the floral world. The same treatment in the preparation and sowing of the seed applies; but the seed boxes require a covering of paper or glass; or the boxes can be placed under a frame, which will answer as well. When the plants appear, tilt the cover a little, so as to admit air and light and so harden the plants. As soon as the latter are fit to handle, transplant first into small pots; then into larger pots for final flowering.

The following list of flower seeds of most showy varieties will be found suitable for general garden purposes:—

Hardy Annuals.

Acrolinium	Gaillardia	Marvel of Peru
Adonis	Globe Amaranth	Mignonette
Alyssum	Godetia	Nasturtium
Amaranthus	Helichrysum	Nemophila
Browallia	Helianthus (sunflower)	Poppy
Calliopsis	Hibiscus	Phlox
Candytuft	Ipomea	Rodanthe
Centaurea	Jacobea	Saponaria
Clarkia	Larkspur	Stocks (Ten-week)
Clianthus Dampieri	Linaria	Stock (Virginia)
Dianthus	Lupins	Whitlavia
Dolichos	Leptosiphon	Zinnias
Eschscholtzia	Marigold	
Everlasting Pea	Mirabilis	

Half-Hardy Annuals.

Aquilegia	Heliotrope	Pansies
Asters	Hollyhock	Pink
Anemone	Ice plant	Picotees
Antirrhinum	Lobelia	Pentstemon
Balsams	Lychnis	Portulaca
Daisy	Maurandya	Rocket (sweet)
Carnations	Mesembryanthemum	Stocks
Chrysanthemum	Myosotis	Sweet William
Celosia	Nicotiana	Thunbergia
Campanula	Oxalis	Tropœolum
Cuphea	Petunia	Verbena
Digitalis	Pyrethrum	Violets
Gladiolus	Pelargonium.	Wallflower.

Biennials and Perennials.

Begonias	Cyclamens	Nertera
Calceolaria	Gloxinias	Primulas
Cineraria	Geraniums or Pelargoniums	

Having made out a list of the seeds required, I would advise that a request be sent with your order to your seedsman for a catalogue of his stock, as varieties are constantly being improved upon and changes made. Besides, you will be able to gather from the catalogue supplied much useful information as to the best time to plant the various varieties, in order to ensure success.

PREPARING AND MAKING UP THE SEED BEDS.

Before commencing with your seed beds, let your first attention be given to the soil and to the drainage of the garden plot. It should be the first care of the florist to make drains from the highest part of the ground to the lowest, and if there be no outlet at the lowest part, to dig a hole or well, into which all these drains should lead. The object of drainage is not only to get rid of superfluous moisture, but also to prevent the little there may be from remaining stagnant.

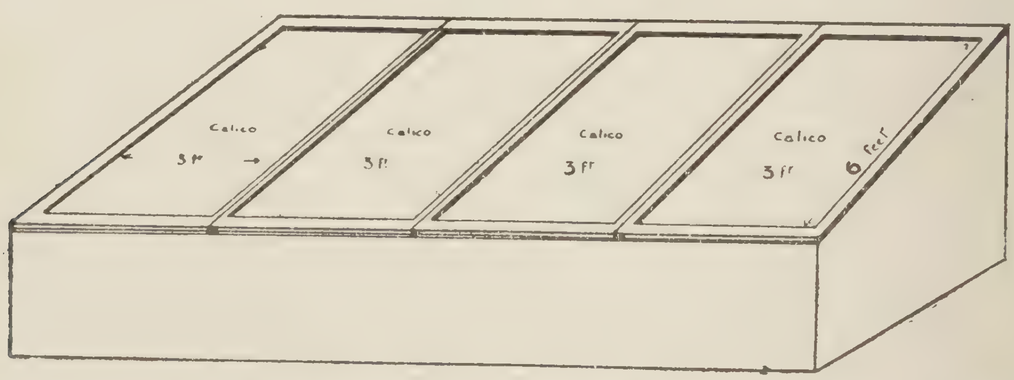
Therefore drainage is most necessary before we can proceed with our seed beds, which should be selected in a shady spot, or a rough structure of saplings must be erected about 6 feet high, and covered with the small boughs of ti-tree that are to be found in most districts of the colony, both in the scrubs and forests. The size of this shade-house can be determined by the number of plants and varieties desired.

As before stated, reduce the soil to as fine a tilth as possible. The soil should be composed of rich scrub, containing plenty of humus, mixed with sand or charcoal to make it porous. The beds are the better for being raised about 6 inches above the surrounding ground, in order that drainage may be accomplished more rapidly in times of excessive rains. If scrub soil is not obtainable, it will be necessary to make a compost, by stacking turf, decayed leaves, and vegetable matter in a heap till thoroughly rotted, then mixing, with one part of well-decomposed cow manure, charcoal and sand (or even brick-dust will do), well mixing these ingredients. It will be found there is scarcely any flowering plant that will not grow well in such a mixture.

MAKING OF A HOT BED.

Sometimes it is found necessary in gardening operations if we would be early in the market with flowers, plants, or even some classes of vegetables—such as cucumbers, tomatoes, melons, &c.—to employ artificial heating for early forcing. Especially does this apply in the Southern portions of this colony,

and by adopting this method it enables market gardeners, florists, and others to obtain better prices, sometimes as much as 50 per cent. more than if they waited till the natural heat in the soil would have the desired effect in the open ground, whereas by starting in a hot bed or frame quite a month's growth and sometimes more may be gained in advance of the season. To make a hot bed, let a quantity of stable dung be got together, according to the size of the bed desired and the frame to be used. From two to three loads will give a fair-sized bed. Let it be about 2 feet in depth, including an equal quantity of leaves, as these latter will help to create a more moderate and lasting heat. The dung should be turned over in the bed about every third day for a fortnight, and kept wetted if dry. This is most important, because if not sufficiently worked you will stand the chance of losing your plants at the beginning by overheating After the bed has stood for a fortnight or three weeks, you can measure off the bed, allowing about 12 inches of it to project all round outside the frame. Now drive in four stakes, one at each of the corners to serve as a guide. Then get some slabs of hardwood, or, if obtainable, weatherboards will do, and secure them firmly to the stakes, having a rail of 3 by 2 hardwood fitted on the top of the stakes, so that the frames can rest thereon; glass is generally used for the sashes, but I have found a thin oiled calico to answer admirably. It is cheaper, not so difficult to procure, and easier mended in case of a mishap. See that your frames cover the sides round the hot bed closely. Immerse the calico in a tub of water, then wring it out. Nail it on the frames, using a a strip of strong tape, or leather for preference, between the nails and the calico. When dry, take 3 pints of linseed oil, 1 oz. sugar of lead (acetate of lead), and 4 oz. white resin. Grind the sugar of lead with a little of the oil; pound the resin, and add these to the remainder of the oil. Warm the ingredients in an old saucepan or iron pot, over a gentle fire, and with a large brush apply hot to the calico. On the following day the frames will be fit for use, and with care will last some time; the cost of the materials for covering four frames 3 feet wide and 6 feet long is as follows:—Calico, 8 yards, 4d. per yard, 2s. 8d.; 1½ gallons linseed oil, 5s. 6d.; 2 oz. sugar of lead, 1s. 4d.; 8 oz. white resin, 1s.; total, 10s. 6d. This will give you four frames to cover a hot bed 12 feet by 6 feet. The accompanying rough plan may help to illustrate the meaning—



Of course, the walls may be raised to any height required, but this is a size I have used myself, and have found it to work admirably. Always remember, as the seeds germinate and the plants begin to grow, to elevate the frame a little to give air and harden the plants. Whilst writing on the forcing of early growth of plants, I may mention a plan I adopted after reading it in one of the earliest issues of the *Agricultural Journal* on the question of getting early fruit, and as it proved very successful it will bear repeating. The plants experimented with were strawberries. According to the published instructions I procured a cask and bored with an auger a number of 1½-inch holes about 8 inches apart all round the cask. This done, I placed about 2 inches of stones, rubble, &c., in the bottom of the cask, and then took a piece of 3-inch iron piping, one end (the bottom) being stopped up with a piece of wood. This end rested on the stone in the middle of the cask. I perforated the piping with a

quantity of small holes, leaving the open end of the pipe about 3 inches above the top of the cask, when in its place. I next filled the cask with a rich compost, and as each perforated hole round the cask was reached, I placed a root of a strawberry with the crown of the plant protruding through the hole, and so on till the cask was filled, finishing by placing four plants on top of the cask round the piping. The piping was then filled with water, which trickled through the perforations, keeping the plants moist and in vigorous growth, as I was enabled to use manure water most effectively. The result was I had 48 plants growing on a base of 2 feet in diameter, the cask being about 3 feet 6 inches high; and when the plants were in bloom and the fruit appeared, a novel and charming picture was presented. The fruit was quite a month earlier in the market, and of weeds there were naturally none; thus the whole of the nutriment supplied went to the plants.

COW PEA: *VIGNA (DOLICHOS) SINENSIS:*

By W. SOUTTER.

This plant of late years has come into great prominence in Queensland. It is a legume of somewhat uncertain botanical relations, producing a luxuriant growth of vines and a large number of long pods containing edible seeds. As the plant seems to have originated in a warm climate, it is well adapted for cultivation in the coastal districts of the colony. When grown under high tropical or opposite climatic conditions, it produces luxuriant vines, but sets seed badly; the most favourable zone for the production of seeds lies between the latitude of Rockhampton north and Sydney south.

The chemical composition of the cow pea is such that it is a most valuable enricher of the soïl, especially where nitrogen, phosphoric acid, and potash are deficient. The plant is rich in these; the amount of each of these elements, per acre, being, approximately—Nitrogen, 205 lb.; phosphoric acid, 33 lb.; potash, 155 lb.—*United States Bulletin*, No. 15, p. 100.

The beans should be sown in the early spring as soon as all fear of frost is past; in America it is customary to sow broadcast at the rate of 2 bushels per acre. But Queensland experience proves that the better plan is to sow in rows 3 feet apart and drop the same as maize, which reduces the quantity per acre by about two-thirds; also, if sown too early in this colony the pods ripen very unevenly, the early ones being ripe and shed their seed before the main crop is matured.

The cow pea will stand almost any amount of heat and drought; this was evidenced at all the State farms last summer—when every other plant was flagging in the heat, the cow pea was erect and green.

If cut for hay when just in bloom, the roots will sprout and produce a second crop; but if required for seed the plant should be allowed to grow from the start. The average yield of beans being about from 15 to 20 bushels, hitherto the great difficulty here has been the harvesting and thrashing of the crop. No doubt, as the crop becomes more largely grown, some means will be devised for the handling of it.

The manurial value of the cow pea when used as a green manure is of considerable importance.

It is yet, however, a moot point at what period of the plant's growth, when ploughed in, the best results are obtained; experiments in this direction are being carried out.

HOW OUR NEIGHBOURS LIVE.

From the *Co-operator* we take the following graphic description of farm life in what may fitly be described as "the home of the frozen" in Australia. It is difficult to realise that within the borders of New South Wales, the land of heat waves, there is a territory of almost Arctic iciness. Yet it is true that at Kiandra, but 200 miles from Sydney, the inhabitants are snowed up for the chief part of the winter, and are compelled to go about in the costume of Greenland or Lapland :—

Kiandra is but of the smallest now, though it has had its "rush," and still gives a little encouragement to industrious goldminers. Its size can be gauged by the Australian standard of the number of hotels. It contains two; therefore the population can be guessed as extremely limited. Find the number of public-houses in a town and allow about 130 inhabitants to each, and you will hit the mark very fairly.

To see the whole population on snow-shoes strikes one as very comical at first. Even the children attending school are obliged to wear them, or, rather, are mounted on them, and, in fact, no one could get about unless thus accoutred. They are made of any strong wood cut from trees in the neighbourhood, and are about 8 feet long, turning up nearly 1 foot in front. Made locally, they cost 10s. a pair. It is difficult for a new chum to manage the clumsy article at first.

The gum-boots, too, are another purely local article of attire. These are very essential to comfort and health in that wet region, but are, unfortunately, expensive, costing 35s. a pair. Women, as well as men, patronise them; those for the gentler sex reaching only to the knee, while the men's go as high as the thigh. They are made of a peculiar black and shiny gum, impervious to wet, and made warm by a lining of opossum skin. Though so strong to all appearances, they are extremely liable to crack and break up if subjected to rough usage. However, the men say they would not be able to plough or do any field work at all in winter were it not for their valuable protection, as the feet become numb and frozen in ordinary footwear As it is, with snow-shoes, gum-boots, and thick knitted woollen socks, every man, woman, or child seems to suffer cruelly from chilblains. A number of the people, particularly the old women, go about enveloped in blankets over their other garments, and the skin of the platypus is much sought after for capes and mufflers.

Stock, of course, cannot exist amid such rigours, but there is no trouble in finding good feed and shelter for them at Yarrangobilly, only 18 miles away. The change of temperature in that short distance is nothing less than marvellous. Yarangobilly is comparatively low-lying, while Kiandra enjoys the distinction of being the highest town in Australia. But a few miles out and Mount Kosciusko can be seen to raise its majestic, white-tipped crest amongst many other hills of great height. No cows being retained in the neighbourhood in winter means that fresh milk is an almost unknown quantity. "Condensed" is largely used, and a few lucky ones have goat's milk. Butter is salted down, and potatoes are "pitted" in summer for use in the cold season. Fresh meat is then another unobtainable luxury, as the sheep and cattle are all sent away. The monotonous diet of salt meat for months at a stretch would in itself be enough to dissuade an epicure from residence on the Snowy River. In addition to this he would have to put up with frozen bread that requires an axe to cut, frozen preserves and pickles, and frozen eggs, if he was so lucky as to get any of these at all. The housewives of the district never dream of employing any of the ordinary methods for preserving eggs. They simply put them by, and let the cold do the rest. They may keep for months, but occasionally the frost cracks the shells, and then they are useless. There are no vegetables except potatoes, and fruit is almost as great a curiosity to the Kiandra resident as ice to a dweller in New Guinea. The people have got it into their heads that it is of no use attempting to grow fruit in such a severe climate, but surely certain berries, such as the raspberry and the currant, would do well there, as they do in the coldest parts

of Tasmania and Gippsland. Some years ago a similar idea prevailed regarding the rearing of poultry, until one family made the experiment, and it proved successful. Now there is scarcely a homestead without its well-stocked fowl-house, though one sometimes hears of fowls being frozen to their roosts. That last declaration may be smiled at, but it does not seem absurd when one hears what often happens to a bottle of vinegar. The frost breaks the bottle clearly round as though cut by a diamond, leaving the vinegar standing up solid and shapely, looking like a delicious amber jelly, but to the touch as hard as marble. Medicines and cordials, too, freeze very frequently in their bottle.

In winter it is impossible to go from house to house after the sun goes down. However, the residents are cheerful and healthy. There is a noticeable dearth of good complexions among the girls. They account for the roughness and redness of their skins by explaining that they have to break the ice to get water to wash themselves with, and then get into the way of using the floating lumps as soap. One wonders that, under this treatment, they have any top skins at all.

Perhaps life in an ice-chest would have its charms for some people, but it would seem that, on the whole, dwellers on the snowy heights of New South Wales can have no superfluous pity to bestow on the exiles of Siberia or the denizens of Iceland.

CANNING TOMATOES.

Select smooth, meaty tomatoes, not overripe or they will be too juicy. Place in a wire basket and immerse in fast boiling water for 3 or 4 minutes, plunge at once into cold water, then the peel will come off easily. Cut in halves lengthwise, and remove all seeds that separate from the fruit. Cook in a porcelain-lined kettle until half done; stir carefully from the bottom to ensure cooking evenly.

Use self-sealing glass cans. Look the cans, covers, and rubbers over carefully; reject all covers that are not true around the edges; if the rubbers are not soft and pliable, use new ones. Put the cans and rubbers into a pan of hot water on the stove; fill the cans with hot water. Place a few flat sticks in the bottom of the pan for the cans to rest upon to prevent breaking. When ready to fill the cans pour out the hot water, and fill at once while the can is hot with the boiling tomatoes. The can must be brimful.

Pass a spoon down into the can, so that the air bubbles and part of the juice and seeds will come to the top; crush the bubbles, and dip out part of the seeds and juice. Removing the seeds and juice is necessary to ensure success. After this is done if the can is not brimful, put in more tomatoes. Place on the rubber and cover, and screw down as tightly as possible, being careful that no seeds are under the cover. Turn the cans upside down for 4 or 5 hours. If no juice oozes out in that time, your tomatoes are quite sure to keep. Wrap the cans in two or three thicknesses of cloth or soft paper to exclude the light. Keep in a cool dark place.—*American Agriculturist.*

The same journal has also the following on the subject of canning tomatoes:—

The first step for success in canning tomatoes is the proper selection of the vegetable. Reject all soft, overripe tomatoes as well as those underripe, for only firm, solid, well-reddened tomatoes will produce a perfect result. Before proceeding further, get the cans ready. Whether old or new are used, wash them in cold water, then in hot water, in which a plentiful supply of soap powder or sal soda has been dissolved; this will sweeten them and destroy any lingering taint. Especially examine the covers and clean with a small scrubbing brush, and the last thing plunge each jar and cover in boiling water; this will destroy any floating mould or fungus germs that may start future fermentation.

A word about the kind of cans used. Personally, I much prefer glass for everything. Stone cannot be depended upon, for if a small spot is not covered by the glaze, air will come through the porous ware; then, too, the salt glaze is gradually destroyed by use. Tin I never use; but if you must use tin cans, use new ones, and wash as carefully as the glass.

Now you are ready to prepare your fruit. Scald a few at a time in boiling water, letting them remain in the water only long enough to loosen the skins. Remove all at once, and you will not have mushy fruit from over-scalding. Peel all you are to can before you begin, so you can give undivided attention to the cooking. Put only enough in the kettle at one time to fill a few cans, then the last will not be over-cooked and watery.

Do not put any water in the kettle, as enough juice will have run from them while peeling to start the first kettle. Season with salt as for the table. Let them boil up until thoroughly scalded, but it is not necessary for each tomato to soften, as quite solid fruit may be heated through. Just here your judgment must be used. Have the fruit as nearly whole as possible; but if not scalded through they will not keep. Fill to the brim one can at a time. Use a new rubber and a cover carefully fitted previously, so there will be no delay.

Right here you must work fast. Fill the can with the boiling fruit, add one more tomato, wipe the seeds off from about the rubber, screw on the top—which will press down the extra tomato and ensure a full can. After the top is screwed on as tightly as possible, reverse the can a moment, and if by any chance there is an imperfection in the cover, can, or rubber, or a misfit, a few bubbles of juice will escape, and you must return the contents of the can to the kettle and do your work over. This often saves a good many failures.

You will have much nicer canned tomatoes if you fill the cans with the more solid parts and only pour in enough juice to fill in the spaces. The last of the juice may be boiled down for a can or two of juice for tomato soup.

GINDIE STATE FARM.

Report on Crops for Month ending 31st August, 1900.

Name of Crop.	Planted.	Area.	Drilled or Broadcast.	Rainfall during Month.	Treatment during Month.	Growth during Month.	Date Harvested.	Quantity Harvested per Acre.	Total Quantity Harvested.
Wheat—		Acres.		Inches.					
American Blue Stem	11-4-00	13·14	Broadcast and drilled	0·55	...	Fair	...	...	...
Marshall's No. 3...	13-4-00	31·5	Drilled ...	...	...	,, ...	...	...	...
Marshall's No. 8...	14-5-00	10·31	Broadcast	...	...	Rather poor	...	...	...
Oats	21-5-00	1·20	,,	...	...	Poor	...	...	...
Rye	21-5-00	1·5	,,	...	...	,, ...	...	...	...
Allora Spring ...	28-5-00	9·61	,,	...	...	Fair	...	...	...
Malting Barley ...	29-5-00	9·70	,,	...	...	,, ...	...	...	...
Field Peas	31-5-00	2·90	Drilled ...	...	Hoed ...	Good ...	...	...	...
Budd's Early ...	1-6-00	12·27	Broadcast	...	...	Poor ...	...	...	...
Stud Wheat (225 var.)	...	...	Drilled ...	...	Hoed ...	Good ..	...	..	...
Maize (Early Mastoden)	8-8-00	10·0	,, ...	...	...	,, ...	...	...	..

Remarks.—Owing to the slight rainfall this month—0·55—the growth of the crops has been rather poor, with the exception of the field peas and stud wheat. The peas are in full bloom and should we be favoured with rain within the next couple of weeks they would give a good return. The 10 acres of maize planted has come up very well, and is looking as well as could be expected, but rain is urgently required for all the growing crops. The following are the maximum and minimum readings for the month—Highest solar reading, 138°; highest shade reading, 86·5°; terrestrial reading, 23·0°.

The above was overlooked last month.—Ed. *Q.A.J.*

Report on Experiments for Month of September, 1900.

Name of Crop.	Date Planted.	Area.	Drilled or Broadcast.	Manure Applied.		Treatment during Month.	Rainfall.	Growth during Month.
				Name.	Per Acre.			
Wheat—		Acres.						
American Blue Stem	11-4-00	13·14	Drilled ...	...	...	...	0·26	Poor, owing to want of rain
Marshall's No. 3...	13-4-00	38·5	,, ...	...	...	...	...	...
Marshall's No. 8...	14-5-00	10·86	Broadcast	...	...	...	...	...
Oats	21-5-00	1·30	,, ...	..	...	..	...	...
Rye	21-5-00	1·05	,, ...	...	...	...	...	...
Allora Spring ...	28-5-00	9·61	,, ...	...	...	...	...	...
Malting Barley ...	29-5-00	9·70	,, ...	..	...	...	..	...
Field Peas	31-5-00	2·90	Drilled ...	..	...	...	...	...
Maize (Early Mastodon)	8-8-00	10·0	,, ...	...	...	Cultivated once	...	...

Remarks.—Owing to the dry weather, there has been little or no growth of the wheat during the month. The 10 degrees of frost that we experienced in August has played sad havoc with a part of it. Any of that which was well out in ear does not appear to have received any damage, but that portion which was just appearing out of the sheath has suffered very much. In many instances the ear is killed for three parts of its length. This will materially affect the yield, but, judging from present appearances, the grain that is left will be of fine quality.

The 10 acres of maize planted in August has made good growth. When planted there was just sufficient moisture to bring it up. It has only been cultivated twice, and, though only 0·26 inch rain fell since it was planted, it has made good growth.

HERMITAGE STATE FARM.

Report on Crops for Month ending August, 1900.

Name of Crop.	Planted.	Area.	Drilled or Broadcast.	Rainfall for Month.	Treatment during Month.	Growth during Month.	Date Harvested.	Quantity Harvested.	Total Quantity Harvested.
Wheat—	May.	Acres.		Inches.				per a.	
Marshall's No. 3...	2nd wk.	6	Drilled ...	1·135	Fed off with sheep	Good ...	...	...	...
Marshall's No. 8...	,,	6	,, ...	...	,, ,,	,, ...	...	...	...
Canadian Blue Stem	,,	4	,, ...	...	,, ,,	,, ...	...	...	...
Barley—	June.								
Old English ...	1st wk.	12	,, ...	...	Nil	Checked by frost	...	...	...
Sea of Azoff ...	,,	5	,, ...	...	,, ...	,, ,,	...	...	...
Rye	,,	4	,, ...	...	,, ...	Strong ...	...	...	..
Wheat—									
Belotourka ..	,,	4	,, ...	...	,, ...	,, ...	...	...	...
Budd's Early ...	,,	8	,, ...	...	,, ...	Moderate ...	...	...	...
No. 3	,,	6	,, ...	...	,, ...	Very rank ...	...	...	...
Blue Stem ...	,,	$2\frac{1}{2}$	,, ...	...	,, ...	Moderate ...	...	..	...
Allora Spring ...	4th wk.	11	,, ...	...	Rolled ...	Splendid ...	...	...	...
Budd's Early ..	,,	7	,, ...	...	,, ...	,,	...	...	...
Peas	2nd wk.	2	,, ...	...	Horsehoed and hand hoed	,,	...	...	...
Lucerne	1st wk.	8	Broadcast	...	...	Just above ground, slow	...	...	...
,, (last year's sowings)	...	16	,, ...	...	...	Checked by frost, slow	...	...	...

Report on Experiments for Month of August, 1900.

Purpose of Experiment.	Name.	Area.	Sown.	Drilled or Broadcast.	Manure Applied.	Method of Application.	Treatment during Month.	Rainfall.	Growth.
	Wheat.	Acr's	May.						
Of determining best yielders and hardiest varieties	80 varieties stud wheats	14	2nd wk.	Drill ...	Nil	Reid & Gray drill and harrowed	Eaten off by sheep	1·135	Moderate; checked by being eaten off, and Fife-Indians by frosts
Most suitable and rust-resistant qualities	188 var. nomenclature wheats	...	3rd „	Hand sown in drills and covered with hand rakes	„	„	Cleaned with hand hoes	...	Very strong. These drills are all labelled for the convenience of visitors to study.
	192 var. Farrer's Pedigree	...	4th „	ditto ...	„	„	„	...	Good. Ditto ditto.
Proper quantity to sow per acre — Plot No. 1	Marshall's No. 3 ...	1	1st „	Drilled. 1¼ bushels ...	...	„	...	...	Good; too thick; not room to stool.
No. 2	...	1	1st „	1 bushel ...	...	„	...	...	Good; being newly broken-up land, this quantity is quite enough per acre.
No. 3	...	1	1st „	¾ „ ...	...	...	...	...	Rather thin sowing for new land; stooling well.
No. 4	..	1	1st „	½ „ ...	...	...	...	...	Good; too thin sowing for new land.
	Potatoes.		Plant'd						
For best croppers and hardiest variety, as well as keeping and table qualities	20 home-saved varieties	...	27 Aug.	Rows ...	Rotten stack bottoms (heavy)	Furrows opened 6 in. deep and filled up level with manure (potatoes at the bottom of drill), lightly covered with plough, and harrowed level		...	The set are fine tubers (about 2 oz. each), the rows 3 feet 6 inches apart, and planted at 15-inch intervals in the rows.
	8 new imported varieties	...	31 „	„ ...	Rotten stable manure (heavy) dressing	Same method as foregoing		...	These were very small tubers indeed, and are planted very much closer in the rows.

Eight different fertilisers were sown with Budd's Early Wheat, on 30th June, in ¼-acre plots. The wheat has grown rapidly during the month, but up to the present there is no perceptible difference in the plots, although much ranker than the unfertilised plots.

For other notes please see "Progress" and "Special" Reports for this and past month.

Report on Crops for Month ending September, 1900.

Name of Crop.	Sown.	Area.	Drilled or Otherwise.	Manure.	Rain for Month.	Treatment during Month.	Growth.
Wheat—		Acres.					
Budd's Early, Marshall's No. 3, Marshall's No. 8, Blue Stem Belotourka	May	35	Drilled ...	Nil ...	2·11	Nil	Slow, owing to frosts.
Budd's Early, Allora Spring	June ...	18	,, ...	,, ...	...	,, ...	
Barleys (5 varieties)	May and June	25	,, ...	,, ...	...	,, ...	Slow.
Lucerne	Last year ...	20	Broadcast	,, ...	...	Harrowed and rolled	Very slow.
,, ...	Resown this month	7	,,	,, ...	...	,, ,,	,, ,,
Maize (8 varieties) ...	This month	40	Hand dropped	,, ...	...	Drills opened with plough; covered with Pl. Junr.; harrowed and rolled	Slow; badly cut by frost.
Field Peas	...	3	Drilled ...	,, ...	...		

Remarks.—A very sharp frost occurred on the morning of the 28th. Five other frosts were experienced during the month. Beyond checking growth, none of the main crops of cereals were injured.

Report on Experiments for Month of September, 1900.

Purpose of Experiment.	Name of Crop.	Area.	Sown.	Fertiliser.	Growth during Month.
		Acres.			
Test for most suitable fertiliser, and best variety to grow for general purposes	Wheat — Budd's Early (8 plots)	¼ each	May ...	8 varieties; results to be made known after harvest	Good.
Latest yield...	Potatoes (24 varieties) ...	...	Late Aug.	Rotten straw... ...	Slow.
Test fertilisers	Maize (Pride of the North)	3	This month	8 varieties	All nicely up.

IN STACKING CORN,

whether tied or loose, it is well to see that the roof is built so that the least possible harm is done by rain falling thereon. To ensure this, the middle of the stack should be thoroughly well filled in, even to the extent of forming what is called a false roof, once the walls have reached the height to which it is intended to take them; then the sheaves used in finally finishing off the roof may be placed so that the butt ends slope downwards and cover the ears; in this position they act as a form of thatch, and prevent any but heavy rainfalls from entering the stack. The rougher the butt ends of the sheaves may be, the better they will answer for this purpose.

One occasionally sees the sheaves placed in the roof with the butt ends raised higher than the ears. Nothing could be worse, for the sheaves sloping inward conduct the rain into the stack instead of down the roof, and thus considerable harm is caused. When stacking loose corn it is equally important that the middle of the stack should be well filled in and a false roof formed before finally finishing off. Loose corn when stacked and unthatched is liable to more harm from rain than is the case with tied corn under the same conditions; therefore it is important that the thatching should be done as quickly as possible.

It frequently happens that the stacks cannot be finished off in consequence of nightfall or because of going on to cart some other crop; in such case the middle should always be left well filled in, and a cloth put on if likely to be required.—*Exchange.*

EXTRACTS FROM THE MONTHLY PROGRESS REPORTS OF THE BIGGENDEN STATE FARM.

AUGUST, 1900.

During August the weather has been mostly mild, sometimes even muggy, with a few sharp frosts, the grass thermometer dropping as low as 14 below freezing point on the 14th. The rainfall amounted to only 0·98 inch in seven days, the heaviest fall being 0·42 on the 15th.

The field work has consisted chiefly in keeping clean the growing crops, and in ploughing and subsoiling all available land whenever weather and time would permit.

A ½-acre block of Nepaul barley, and two 1-acre blocks of Blue Stem and Belatourka wheats, respectively, got rust in a rapid and virulent form. They had all to be mowed down for hay, and the land has been prepared for some summer crops.

Sowings have been made with such seeds as I had of the following summer crops:—Maize, pumpkins, squashes, and marrows, water, rock, and cattle melons, beans, peas, &c.

An interesting experiment has been initiated with the principal fertilisers now obtainable on the Queensland market. Our manures experiment plot is so arranged that the most unobservant man can see at a single glance the effect of the different manures on the most varied crop. As we keep a record of the kinds and quantities of manures used, also of the cost per acre, it will be easy to find out whether it would pay a farmer to use them for a given crop or not.

In the orchard most of the trees planted last month have already made a good start.

In the vineyard the vines have been pruned the last day of the month personally by Mr. Rainford, who has also planted a good few new varieties and replenished the very few misses occurring in last year's planting. Mr. Rainford expressed his satisfaction at the good tillage of the land, and at the exceptionally vigorous growth of most of the vines. Some of the vines have been photographed by Mr. Wills, both before and after being pruned. If continued in subsequent years this should form an interesting record of the training and life of the vines.

As a cure and preventive against anthracnose and other fungoid diseases, the vines have been, according to directions, painted by means of a hair brush with a solution of sulphuric acid composed of 1 part of the acid to about 16 of water.

The sugar-canes have been cut down, and the sets of the best sorts distributed to those of our farmers who are desirous to try the crop on a small scale. Our horses are in good health and condition, and find a welcome addition to their usual feed in the nice spring of the young grass. Our two colonies of Italian bees have hardly ceased to work at any time during the winter. They have now nice combs of broods, and begin the new campaign under favourable conditions.

SEPTEMBER, 1900.

During September we have enjoyed an abnormally good season, the weather being practically all that could be desired. The rainfall amounted to 3·16 inches in seven days. Whilst the days were warm and enjoyable, the nights have been pretty cool. Many a time the grass thermometer dropped to slightly below freezing-point. Light frosts have touched the sweet potato vines in low-lying places of the district, but no damage was done to the farm.

About eight days have been occupied in preparing exhibits for, and attending with them, at the Gympie show, where the work done on the farm by the Department has been well spoken of and appreciated by both the farmers and the general public.

Such good growing weather as we have enjoyed has been also favourable to the growth of weeds, so that the scarifier and the hoe have to be kept going at all available times. More maize has been sown. To those who can afford to buy the implement, I always strongly recommend that this work be done by by means of a single-drill cornplanter such as the Molline, or, still better, of a double drill, one such as the "Tiger." They save both time and seeds, and make better work than can be done in any other way. But as many farmers have them not, and have to do the best they can with such implements as there are on a farm, I will explain in a few words how I go about it. When my land is worked as deep as possible and well levelled and pulverised, I open the drills 4 feet 6 inches to 5 feet apart with the single-furrow plough; then drop the seeds by hand from 12 to 18 inches apart. To cover, I use the Planet Junr. reduced to two teeth, or, still better, the cutaway harrows, to the pole of which I have fixed two Planet Junr. mould boards so set that they throw the earth from the sides towards the centre of the drills. Such an arrangement makes undoubtedly good work, leaving the land well worked and the seed well covered in a slightly depressed drill, but it costs about 100 per cent. more than when the work is done by means of the cornplanter. It has still another drawback. During the process of planting, the drills have to remain open for a certain length of time, during which a considerable amount of the moisture of the soil is evaporated and lost. This retards the germination of the seeds, and not seldom causes them to make an uneven start.

Successive sowings by means of the hand seed-drill Planet Junr. have also been made of different varieties of sorghums, millets, broom millets, all sorts of beans, &c., also *Brassica* and *Curucbitaceæ*.

On the 24th we gathered, under favourable climatic conditions, our first crop of lucerne from a plot which had been sown exactly four months ago, as stated in previous reports, with a view to ascertaining whether paying results could not be obtained from lucerne grown on forest land. So far, the results have been very satisfactory. Although the soil is patchy, as had been remarked by Mr. Brünnich in his analyses, the crop of hay amounted to fully 2 tons per acre, and the length of the plant reached in some places from 2 feet 6 inches to 3 feet. It goes without saying that the plant will not live here as long as if grown on a bottomless alluvial soil, where roots can extend to a great depth. But should the plant do well and proper for two or three years only, it would still be a very valuable crop to grow on a farm.

In the orchard most of the trees have made good progress.

The vines have also emitted vigorous shoots which, in my opinion, require looking after, in order to shape the vines and equalise the flow of sap.

Our paddocks being subdivided, we have always an abundant supply of fresh and well-grown grass, whilst in places which are stocked all the year round the good grasses never get a chance to seed, and are soon replaced by coarse, useless, or noxious species.

POTATO CULTIVATION.

ITS PROGRESS ON THE DARLING DOWNS.

By J. R. MARTIN.

We have received from Mr. H. Symes, secretary of the Drayton and Toowoomba Agricultural and Horticultural Society, the following interesting and useful paper prepared and read by Mr. J. R. Martin, at the Westbrook State School, before a meeting of local residents.

Mr. Martin commenced his paper by adducing several historical facts in connection with the discovery of the potato in South America by the Spaniards in 1535, and its introduction into the British Isles by either Sir Walter Raleigh or Thomas Herriott, and, continuing, said:—

So far as my knowledge of Queensland is concerned, I know that when I first came to Toowoomba, in 1863, very few potatoes were grown on the Darling

Downs, and those grown were of poor quality. This was especially so with regard to potatoes grown in Toowoomba, being generally termed the "Toowoomba Soapies." The consequence was that imported potatoes held the local market, the locally grown article being almost unsaleable on account of inferior quality. This was particularly the case with respect to the pink-eyed potato, which was then generally grown on the Darling Downs. Hobart Town potatoes were introduced for experimental growth, but generally proved a failure, and remain so to the present day on the western side of the Main Range. So far as recollection serves me, I believe the first good kind of potato grown on the Downs was a small species called the Whiterock, which possessed the three essentials of being good in quality, good to carry about, and good to keep.

Another sort, called the Snow Flake, also found favour as being of good quality and of larger size. A sort called McCarthy's Flour Ball was also grown with fair success. But none of these sorts were prolific bearers, and consequently did not fill his bags to the satisfaction of the grower. The next sort of potato introduced was the Early Rose, and at the time of its introduction there were a great many new selectors on the Downs. Many of such selectors were farmers, who took up scrub land on the western fall of the range, upon which (among the stumps left in the ground) this sort of potato was planted with the hoe, and gave excellent crops. I have frequently known 5 and 6 tons to the acre to be taken off such land for several years in succession. But though fairly prolific, the Early Rose potato is only of second-class quality, except when grown on special sorts of soil, which affect this class of tuber to a very marked degree in the direction of improvement. The Brownell's Beauty has proved to be well adapted to the Downs. Farmers have cultivated this species extensively, and, as a stock crop for table use and for carrying and keeping, it is deservedly held in high esteem. The Compton's Surprise potato also adapts itself to most soils, but this sort, like the Brownell's Beauty, requires more moisture than the Early Rose species to ensure a profitable crop. In the case of a heavy fall of rain after a long spell of dry weather, the Compton Surprise, like the Brownell's Beauty, will make a second growth, which, of course, affects its value. The Blue Potato, if grown properly, perhaps realises what is required by the grower better than any other species. Although the first attempts to grow potatoes on the Downs were not decried as unholy, as was the case in England, still the very inferior article that was produced created a prejudice against them that was hard to overcome. Fortunately, however, very great improvement has been realised of late years, and now I am justified in saying we can grow as good potatoes as are produced by any country in the world. We have soils capable of growing every variety we please, and of the best quality. So much, gentlemen, for what I have to say before going into the main purpose for which I have prepared this paper. Such purpose has relation to the following important considerations, which must be kept in view by all who intend to give their attention to potato culture, namely:—

First.—The proper preparation of new land for planting.

Second.—Preparing old land, and manuring surface for the same purpose.

Third.—Preparing seed for planting, with consideration of the varieties best adapted for cultivation, and when such varieties should be changed.

Fourth.—Digging the crop, and best conditions for its storage.

If forest land is to be operated upon, the first work necessary is, of course, stumping and clearing off the growing timber, at least two months before the land is to be broken up. If the soil is black and heavy, this is especially needful, since the land will then be more mellow to plough. The best time to break up new land is in autumn, and then allow it to lay fallow until the end of June, when it is an advantage to harrow as fine as possible, following with a heavy roller. The land should then be ploughed the second time, cross ways, to a depth of some 8 inches, or 6 inches at the least. It follows that by doing

this you will turn over the sour soil to the top, and the mellow soil be laid under. Let the land then lie until the end of July. At that time either harrow it again, or, better still, scarify the land with a cultivator, after which it will be ready for the final ploughing and planting with seed in the following spring season.

If the farmer has to deal with new scrub land, the first labour is necessarily falling and burning off the timber, leaving the stumps in the ground. In about three years the stumps will decay, after which they are easily removed. The best time to fell scrub is about the middle of summer, and burn off in autumn, after which the land will be in good order to plant spring potatoes with a hoe among the stumps. This method applies to red, chocolate, or sandy scrub soils, but in scrubs where the land is black experience proves that the land is not good for potatoes until free of stumps. In laying out land for potato cultivation, whether new or old, the work should be done with a little judgment. If the land is level and after heavy rain allows the water to lay upon the surface, such land is not fit for potato culture except it is well-drained and loosened with stockyard manure. From experience I have found this treatment furnishes the best results for land of such character, especially if it has a clay bottom. In fact, I have tried it on land known as "clay pan" soil with success. Still, it is better to grow potatoes on land that would not need such labour and expense. But I have mentioned the method to show that even such kind of land can be utilised in the way stated.

With reference to preparing and manuring old land, as most kinds of autumn potato crops are ripe by natural growth and ready to take out of the ground about the first of June, after gathering, as soon as convenient plough the land deeply so that the undersoil is turned to the top to be pulverised and mellowed by the winter frosts. About the first week in July run the cultivator through it when in a dry state. Shortly after, if the land needs manure, which nearly all old land requires to insure a good yield for the next crop, give a good top dressing of pig or cowyard manure. Then follow with the plough and the roller, when the soil is in a dry state, but let it alone if at all wet. If the land is not dry it will set, and be of no use for potatoes, especially if it is clayey or black soil. By treating land in the way mentioned it will be in good heart for ploughing and planting in the spring time. If you have to use artificial manure, such as the Eagle brand fertiliser, or Surprise Island guano, and bonedust, I find it serves best when sown broadcast at the time of planting winter potatoes, say about February, as we generally get more rain during this month than during any other time of the potato season; besides, the manure requires a certain amount of moisture to be of any benefit to the soil. I have personally tried all the sorts of manure mentioned at the spring planting of potatoes, as well as at the February planting, and have found the best results to follow from the use of pigsty and stockyard manures for the opening planting, and from the use of artificial manure for the February planting. Some people advocate drawing drills, and placing the manure on the seed bed at their bottom. But my experience has shown this method to be a mistake, especially if there happens to follow a deficient rainfall, which is frequently the case on the Darling Downs. No doubt such plan would answer very well in colder, moister climates, where there is greater certainty of rainfall than we have here. Among other advantages which arise from the cultivation of scrub soil is the circumstance that you can work it in a wetter state than forest soil, except it consists of sandy loam, and potatoes will endure more rain in scrub soil than in forest land before they rot. That is, of course, if both have the same or similar natural drainage. But I would advise every farmer to avoid flat clayey soil, as in such soils potatoes are more liable to disease than in soils that are properly drained, either by artificial means or favourable position. The best potatoes are grown on light black soil; sandy black loam grown potatoes are not so heavy in respect of yield to the acre. Tonnage is often of greater consequence to the grower than superiority of quality, for when he takes his crop to market he gets no more

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for the best than he does for second quality. In New South Wales this is not the case, for there they buy according to quality only, which, of course, gives a farmer greater encouragement to grow only the best quality of produce. As many of the farmers on the Downs are in a position to grow good potatoes, but which will not yield a profitable quantity so as to pay for labour and expenses at the current prices, it follows that they are compelled to consider quantity more than quality. The additional expense partly arises from the fact that to grow good potatoes it is essential that the seed should be changed at least every two years. The farmer that knows the necessity for doing so, whenever he goes to town, is on the lookout for a good sample of seed, and it often occurs that when he has found what suits his purpose he has to pay as much for 1 cwt. as he will get for 10 cwt. after cultivating them and taking them to market. I have paid £9 a ton for imported seed, and sold their product for 25s. per ton. This fact proves that farmers do not get much encouragement to change their seed often, since it does not pay to grow potatoes for less than £3 per ton to allow a living margin of profitable return.

With relation to the third division of my subject—namely, the preparation of potato seed and the selection of suitable sorts—most farmers have ideas of their own, and have learned something by experience of what kinds of seed are best suited to their land. I remember that some years ago I visited a farmer living on the eastern fall of the Main Range just at the time he was planting. Observing the work, I remarked that he was laying very large seed. In reply he said that the people in his neighbourhood went in for pig potatoes, which were sold as such, and to advantage. I have known potato seed no bigger than marbles planted on scrub land to have produced a very heavy yield, and all of large size; but to ensure a crop from such small seed the land must be rich and new. I have had opportunity of testing the matter in many ways during the last four years, and have obtained the best results from cut seed of about 2 inches in diameter so that a good potato will make about two sets. There is greater risk of losing some of the seed through rot in a wet season just after you have planted, than if you put down whole potatoes. Still, if this should even be the case, and you happen to lose half of them, you will probably get as much return as if you had planted whole seed. Never plant round seed mixed with what has been cut, since the consequence will be that an uneven crop will follow, because the cut seed will be up a fortnight before the others, and will be ripe so much earlier, putting the farmer to a lot of trouble, especially if he ploughs them out. Doing so it will occur that some of the potatoes will be fully ripe, and the others half ripe, and when the whole crop is bagged the unripe ones will sweat and cause the whole to go bad when stowed away.

When it is desired to have seed potatoes in a forward state for planting, it is not needful to resort to any artificial preparation, since of their own accord, if stood in a dry warm barn, they will be ready for planting. But this will not be the case with seed wanted for autumn planting. There are several ways of bringing seed forward for autumn planting. Some put the seed they require into cases with sand; other people pile them in a barn closely covered over to generate heat. Another plan is to leave them in the ground until dead ripe, then to dig them and put in a barn, covering the heaps with straw. I have used most of these methods, and have found bagging the best. My own practice is to bag the seed I require for February planting, and put the bags in a warm place a month before the time it is wanted. The reason of this is that I find potatoes will shoot more quickly after being bagged. Then I sort the seed, and, taking out the seed that has sprouted, return to the bag or bags what seed has not done so, which process, however, is generally completed before planting time. The best sorts of potatoes to work upon and most adapted to the Downs are the Early Rose, the Suffolk Champion, Brownell's Beauty, and the Blue potato. The two kinds first mentioned ripen about the same time, are generally appreciated for table use, suit most soils, and are sure croppers, both for summer and autumn service. Another advantage for them is that they

will stand more dry weather while growing than any other sorts, though in wet seasons suffering severely. The next two of the old varieties mentioned, Brownell's Beauty and the Blue potato, are worthy of preference for table use, as well as for storing and keeping. Of the new sorts, lately introduced, there are several well suited to the Downs district and soil, but there are others of them which are not so. I have personally experimented with them during the last two years, covering a range of some twenty varieties, and have found ten or twelve sorts of the twenty tried to be of a profitable character. Among them are the Irish Flounder, the Imperator, Early Vermont, Federation, and Satisfaction. All the kinds mentioned are good, both for keeping and for table use. The other new roots, known as the Bliss Triumph and the Drummond Champion, yield well, but cannot be relied upon to keep. The King of Russets and the Manhattan sorts are also good yielders and keepers. Many of the other new kinds need fine black loam or sandy soil to suit them, especially so for the kidney species. I have tried both scrub and forest land in respect of the cultivation of the kinds of potatoes specified, with the exact results stated. As before mentioned, the usual method in preparing seed is to have the sets cut and bagged in hundredweights, and many dust them—that is to say, the cut seed—with fine wood ashes to harden the cut surfaces as a precaution against rot, if the seed should lay in the ground before coming up. The next work is to have your bagged seed carted and placed on the prepared land at 5 chains distance apart along the intended rows. Planting is then usually done by ploughing the land to the depth of about 4 or 5 inches, covering the planted rows with the harrow. This is the customary way, but my experience proves that it is better to plough in the seed by drilling, as after heavy rain the moisture soaks, and stops in the drills. Naturally the ground will be firmer between the drills than if ploughed in otherwise. Some adopt the ancient way of dobbing in potato seed with a sharp pointed stick. Other people plant with a hoe, which is not a bad way when the soil needs drainage. There is one other way I know of, which is to plant the seed on a ploughed surface, and then turn a furrow over on top of the sets. This is not a bad method, since the potato requires a certain depth of loose soil under as well as over the seed. But after the seed is laid, no matter which way it is done, there is still something more to do before the crop is assured. With relation to spring planting, in the first case, if the land is clean, interference is not needed until the haulms begin to show above the ground, then it is necessary to run a light one-horse harrow over them, which can be safely done until the stalks are up some 2 inches above the ground, without any injury to the aftergrowth. This method will save a great deal of labour with the hoe, of which, however, there will be plenty needed before the potatoes are fit to hill. The more work is done among the roots in the way of loosening the soil, either with a hoe or scuffler, between the rows, the more likely you are to get fair return for your labour, provided always if the season is favourable. Even if the weather is dry, the more attention you give the chances of a crop are equally increased. With regard to working land on a potato-field, it is scarcely necessary to say that the farmer should avoid disturbing the plant after the tubers are formed on the rootlets, and, therefore, should not cultivate too close, especially if dry weather prevails and the soil lacks moisture.

To improve the quality of potatoes for table use while cultivating the same seed year after year, without change of seed, advantage follows by planting from red soil to black, sandy, or chocolate soil, if the nature of the farmer's holding will admit of such transfer. This change generally works in the direction of improvement. Another way is to follow potatoes on the same land with rotation crops, such as wheat or maize. For new land, one season with potatoes, spring and summer crops, will leave the land in condition and good heart for spring wheat in the following year, to be succeeded by a crop of maize. For the next season plant with spring maize, followed by oats for hay. After such course of harvesting, allow the land to lay fallow until occupied by a crop of weeds, then plough thoroughly and give the land a top dressing of manure, if possible ploughing the manure into

the ground, which will be found to yield results worth more than the cost of labour. When this work is properly done, the land will be fit to plant with potatoes again in the following month of February. With land treated in this way, well worked, well manured, and so kept in thorough cultivature, good land is none the worse for being constantly cropped, and will give a return in average seasons in proportion to what you bestow upon it. By following out this system of treatment in rotation of crops, the farmer is able to keep down insect pests to a considerable degree, and prevent disease, especially that arising from the "wire worm," which plays havoc with spring potatoes in many seasons. For potatoes, frequent hilling is essential when wire worms are active, since in the process many are destroyed. The best time for hilling is when the potato flower is coming into bloom, and after a light shower of rain. Autumn crops are not so apt to be affected by the fly and the sun as spring crops, but if the tubers are left in the ground far into the winter they require to be well covered up to keep them from injury by frost; and frost-bitten potatoes are of no value on account of the bitter taste caused thereby.

In relation to the fourth part of my subject—namely, "Digging and Storing"—the first thing to know is when potatoes are ripe enough to take out of the ground. This is known by seeing the tops die off, and finding the potato skin to be properly set. Some people advocate the tuber to be dead ripe before being taken out. Others consider that the proper time has come when the tops are seen to be withering and turn to a brown colour. In my own experience I have found the last mentioned to be the best evidence of ripening. I have also found that by not digging the Suffolk Champion, the Early Rose, and other sorts until after the tops die off causes greater risk of injury from the potato fly and the heat of the sun; besides affecting their keeping quality. This refers more particularly to the summer crop, generally dug in the month of December. The autumn crop, usually taken up in June, can, however, be left in the ground until the tops are completely dead, and suffer no damage thereby, unless in the case of a wet winter, which will cause them to rot with great rapidity. For such a case the sooner they are taken up the better. By digging with a fork or hoe you realise cleaner work, but slow progress with larger expenditure of manual labour. It often happens too that the tubers are stuck through with the fork; of course causing them to go rotten. A swing plough, or a proper potato digger, will do the work more expeditiously and without the same risk of damage, but still there is a considerable amount of scratching attending their use, and if the ground is full of weeds many of the potatoes will be left behind, needing to be picked up by hand when cultivated for the following season. I have tried both the implements named, and am now using a Flying Dutchman, which appears to do the work very well. Perhaps the cleanest way to remove a potato crop is by stripping each side of the rows and then running a light plough down their centre. By the use of this method the potatoes will be turned up and readily gathered; but still, of all the methods mentioned, fork digging is the cleanest.

In the matter of storing there are several methods in practice; one is effected by putting a covering of some 6 inches of straw on a prepared heap of potatoes, and on the top of the straw laying another 6 inches of dry earth. But from experience I cannot recommend such method because the whole structure is too airtight, causing fermentation and decay. The method I adopt is to place potatoes in a heap upon a high and dry patch of land, and cover well with straw, or blady grass, which is even better. There is another way, which is to lay them on a barn floor and cover with straw. In either case potatoes need to be well covered to keep them in serviceable condition. I have experimented in storing a summer crop, and found it to be a mistake to heap them up when first gathered, for they are then apt to heat and decay. Among ways in use to prevent such decay to a certain extent, one is to sort the heap over after the sweating process begins and then put them back into a fresh place for covering. Some people will put potatoes into bags for a week or so, in a cool shady place well covered with straw, as protection from the wire worm,

and afterwards sort the potatoes carefully over, and then open them out for a while to be again heaped and covered with straw. It is necessary always to avoid putting potatoes in heaps while damp, for if so treated they soon become valueless. Careful sorting of potatoes a week or so after they are taken out of the ground will generally ensure their keeping. For myself, I have had newly raised potatoes standing on the field in bags, covered over, while it rained for a whole week, without suffering material injury. On other occasions I have stored potatoes away with every precaution, and in three weeks half of them were rotten, while those left standing on the field in bags were nearly all sound; so it arises that of the two experiments it is needless to say which was most satisfactory.

LIVE STOCK FOR SALE AT THE QUEENSLAND AGRICULTURAL COLLEGE.

We are informed by Mr. J. Mahon, Principal of the Agricultural College, that an opportunity is now afforded to farmers and others engaged in stock-raising to purchase well-bred bulls and pigs at reasonable prices. We append particulars of stock for sale; prices for which have been fixed at ten guineas for bulls, two guineas for boar pigs, and one guinea each for sows.

No. 79—Jersey Bull.
Calved 13th June, 1899.
Sire—Lord Harry.

Dam—Baroness; sire, Favourite Baronne; dam, cow by Khedive II.; g d, cow, by Lord Bowen.

Khedive II., by Khedive; dam, Princess, by Lucius (imp.); g d, The Queen, by Cato; g g d, Majestic (imp.), by Major.

No. 80—Jersey Bull.
Calved 11th July, 1899.
Sire—Lord Harry.

Dam—Content, by Effingham Duke (imp.) out of cow by Confidence.

No. 88—Jersey Bull.
Calved 1st October, 1899.
Sire—Lord Harry.

Dam—Ivy, by Effingham Duke (imp.) from Evileen, by Confidence out of Poddy.

No. 84—Ayrshire Bull.
Calved 11th September, 1899.
Sire—Duke of Connaught.

Dam—Ream Routhie; Ream Routhie, by Gordon, 38 A.H.B. of A.; dam, Rosamond, 326 A.H.B. of A.

No. 89—Jersey Bull.
Calved 19th October, 1899.
Sire—Lord Harry.

Dam—Beatrice; sire, Effingham Duke (imp.), from Jersey Belle, by Favourite Baronne.

No. 87—Jersey Bull.
Calved 13th August, 1899.
Sire—Lord Harry.

Dam—Evileen, by Confidence from Poddy.

Middle York.
1 Boar and 2 Sows.
Farrowed, April, 1900.

Sire (bred at Hawkesbury A.C.), by Holzwell III. (imp.) from Lobelia.

Holzwell III. (imp.), by Holzwell Baron (2269) out of Holzwell Midget; Lobelia, by Barber; dam, College Maid.

SMALL YORKS.

1 Boar and 4 Sows.

Farrowed, 24th August, 1900.

Sire (bred at Hawkesbury Agricultural College), by Coleshill Prince (imp.) from Coleshill Lucy (imp).

Dam—By Coleshill Chief (imp.) from Anemone, by White Squall.

BERKSHIRE (Improved).

10 Boars and 10 Sows.

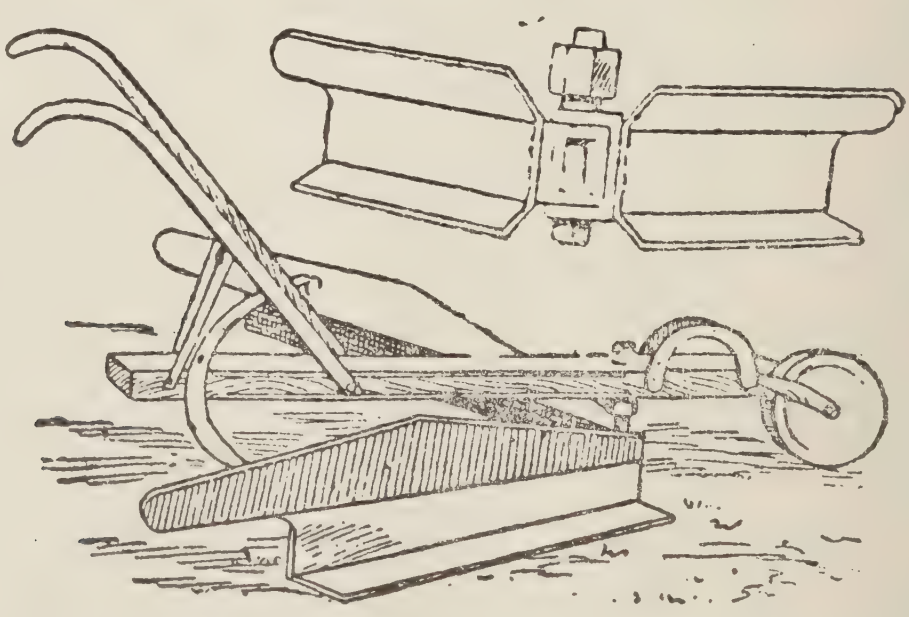
Farrowed, July and August, 1900.

Sire—Frogmore Pippin 2nd, by Frogmore Pippin from Maggie Moore III., by Maori Chieftain 2nd; g d, Maggie Moore I., by Windsor Boy; g g d, Clarenda, by Thumper.

Dams—Fashionably bred sows by Jack, Stanley, Earl Augustus (imp.)

A NEW HILLING IMPLEMENT.

Our illustration shows a new implement for hilling maize and potatoes, in which the mould boards can be adjusted relatively to the advance share, so as to insure the banking of the soil close to the rows of plants at each side of the furrow. The hiller has been patented by Mr. V. A. Whitbeck, of Aquetuck, New York. To the underside of the beam, the *Scientific American* explains, a bracket is secured, at the forward end of which a share is carried, extending up into engagement with the beam. A pivot pin passes through the beam, the bottom portion of the bracket behind the share, and the overlapping projections of the mould boards. These mould boards are straight, and in all positions are within the line of the side edges of the share, so that the earth turned



up by the share passes freely to the outer faces of the mould boards. The mould boards are provided with extensions on their rear ends, from which extensions apertured segmental arms project laterally. These arms are designed to slide one over the other, and are held in adjusted position by means of a bolt passing through registering apertures. By this means the hiller can be adjusted to any desired width. The peculiar formation of the mould boards ensures the earth being carried up close to the roots of the plants and deposited on the upper portions of the rows. The lower part of each mould board serves to cut weeds; the upper part throws rising earth downward, and the straight body sections conduct the earth directly to the plant stems.

Dairying.

A PLEA FOR HAND SEPARATORS.

By J. HOWARD MAYNARD.

A great deal of discussion has been carried on with regard to the cause of the deterioration of the quality of the butter exported to the English market. Nearly all the writers—in fact, I have only read one dissentient—take the view that butter has deteriorated because the private or hand separator has come into use so largely among the cream-suppliers. Being a cream-supplier and a user of a hand separator, I will give a view from the other side. It is not fair to blame the hand separator for the inferior quality of the butter, because we all know that first-class butter can be manufactured from cream separated by the hand machine. The hand separator has come to stay (until something better is discovered), and the majority of the creameries now at work will be closed sooner or later when the milk-suppliers get into a good enough position to buy a separator. It is unfair to abuse the farmer and his hand separator when anyone who has visited the platform where the cream is received must see that this is the place where all the trouble arises. The cream is here received; whether fresh, ripe, or stale, and, when weighed, shot into a general vat to await churning. What is wanted on the part of the butter factory proprietor is that he shall grade the cream and manufacture the butter for export from the best quality. Good butter can be made from the other cream, but it will not keep long, nor stand freezing, and therefore must be sold for local consumption. But grading cream means more tanks to receive it; more tanks mean money, and proprietors do not like spending money. We, as farmers, must admit that a great deal too much over-ripe cream is sent into the factory than should be, and we are even more interested than the manufacturer in restoring the prestige of Queensland butter, as the loss falls on us. The man making the butter is going to have his profit; and if the price of butter falls, down comes the price of cream. There always will be different qualities of cream delivered, and it is for the farmer and the manufacturer to combine to make the variation as small as possible. As long as the factory gives the same price for cream of a certain test, whether it is fresh or stale, a farmer will keep his cream as long as possible, still hoping to deliver it in fair condition at the factory. In this district the almost universal custom is to deliver three times a week in summer, and twice a week in winter. If the factory will offer a higher price for the cream delivered every day, or four times a week next summer, I for one would consider if the extra price will pay for the extra labour. The price should not only be according to test, but also according to quality (freshness). The next point is to consider how to get the cream from the hand separator to the factory in good order, and, as I am told the system working in this district is a good one, I will give a few details of same. From Yahoo Creek to Eumundi the farmers took it in turns to pack the cream on horseback the whole 17 miles, when they got their co-operative hand separator. Now, I believe, there is a two-horse trap that takes it. From Glastonbury Creek to Gympie, a regular carrier picks up the cans of cream at the farm or a convenient place on the road, and brings them in 12 miles. From Bollia to Gympie is about 22 miles; the carrier lives about 15 miles out. He goes to Bollia in the afternoon and returns to his house; next day he goes to the factory with cream cans and home. From the Chatsworth, 4 to 5 miles, the farmers take it in turn to bring each other's cream. On the Brisbane road, one of the farmers does the carrying to Traveston Railway Station. The prices charged for carriage vary from $\frac{1}{4}$d. to $\frac{1}{2}$d. per lb. The above shows that a little

organisation will enable cream to be delivered from long distances as often as necessary, the carrying being a profitable business, including, as it does, an occasional passenger or two, back loading, commission on purchases, &c. If we get the cream properly graded at the factory and delivered before being over-ripe, then we shall soon have the Queensland butter taking again its rightful place on the London market. The factories might help the trade and themselves a great deal by sending a man round among their suppliers to organise for the carriage of the cream, to point out defects in separating, and, in places where cream is kept, suggest improvements in milking-sheds, and in many other ways assist by advice, so that the cream may arrive in better condition. I know some factory proprietors will answer that this is not the factory business, but I am sure that the factory-owner who would send a practical man round (say, once a year) would find it pay, not only from the improved quality of the cream sent in, but also in his increased number of suppliers. If of interest, I can in a future article show why it pays a farmer better to have a hand separator than to send milk to a creamery.

[The trouble is not so much owing to the use of the hand separator as to the fact that some farmers keep their cream too long. If a farmer has nearly filled a can, and then keeps it back because he thinks it will also hold next day's cream, he injures the whole of the cream, and even if he stirs it up and mixes it well together to make a uniform sample, yet the whole will be tainted by the stale cream. Probably the dairy inspectors who visit the dairy farms are not backward in giving sound advice on this subject to the farmers, but many will not follow the advice given, and so injure not only themselves, but their neighbours and indirectly the colony's reputation for butter production.—Ed. *Q.A.J.*]

CHEESE-MAKING SIMPLIFIED.

By BARON JONES,
Late Manager, Travelling Dairy No. 1.

In response to a request from some residents of Maroochy for instruction in making cheese in a small way, we reprint the pamphlet written by Mr. Baron Jones, late manager of No. 1 Travelling Dairy, sent out by the Department of Agriculture during the year 1890. The pamphlet was issued by the Department under the title of "Papers for the People by Practical Men," and will be found to contain all the necessary information.

It has often been remarked by visitors to the travelling dairy that the cheese-making plant is on too extensive a scale for a small farmer to entertain. In order to show the simplicity with which cheese can be made, the pupils of the travelling dairy are instructed in a simple method of making cheese at their own homes by using two ordinary washing tubs in place of a large cheese vat which forms part of the dairy plant. The operation is performed in the following manner:—For a cheese of 10 lb. take about 3 gallons of night's milk, which must be put in small dishes until morning and kept *thoroughly sweet;* then having two tubs ready, one being sufficiently large to contain the other, leaving a space for water between them, place a strainer cloth over the inner tub, then pour in the 3 gallons of night's milk without removing the cream, to which add 7 gallons of morning's milk fresh from the cow. In the outer tub add sufficient water to raise the whole mass to a temperature of 84 degrees Fahr. At this stage about 4 drachms of Barnekow's Annatto or colouring matter should be added and thoroughly stirred in, after which 8 drachms of Barnekow's rennet, mixed with about a pint of cold water, should be also added, stirring thoroughly so as to mix evenly through the milk. The stirring should not be continued more than 1 minute; the milk being allowed to come to a perfect rest, and remain stationary for 40 minutes; when the curd will be of a sufficiently firm consistency to cut, which can be accomplished in the following manner:—Tie together

firmly by the handles two or three ordinary carving knives; draw these so as to cut the curd into squares. After which gently turn these squares of curd so as to present the flat surface to the top; the knives may then be again drawn through, cutting the curd into small cubes or dies of about ½-inch. After allowing the curd to rest for a few minutes, warm water should be let in between the two tubs in sufficient quantities to raise the temperature of the curds and whey to 100 degrees Fahr., taking about 1 hour in doing so; the whole mass being gently stirred during this time to prevent any of the curd from packing together or adhering to the side or bottom of the tub, and to distribute the heat as evenly as possible throughout the entire bulk. The next stage is the most important in the whole process, as upon its being properly carried out depends the whole character of the cheese. Great care in acquiring the taste necessary for ascertaining the proper time for removing the curds and whey is required, as, should the whey be allowed to become in the least sour, the cheese will be spoiled; and, on the other hand, if it is removed while sweet the cheese will not keep sufficiently long to mature. As an indication that the whey has been withdrawn too late from the curd, the cheese after being removed from the press will in a few hours become quite moist and inclined to run a watery substance, not drying or forming a rind as of a properly made cheese. It is necessary to keep the curds and whey at or near this temperature of 100 degrees Fahr. until the whey is *on the point of turning sour*, when the inner tub should be immediately removed from the one containing the water, and, after pouring off the latter, take a piece of cheese-strainer cloth and tie it over the empty tub, pouring the curds and whey in the cloth, the whey running through the latter whilst the curd remains in it. Gently stir the curd to prevent packing and running together, and, after allowing it to cool for a short time, finely powdered salt may be added at the rate of 4 oz. to the 10 gallons of milk used. In half-an-hour the salted curd will be sufficiently cool to be placed in a mould, which is a circular galvanised hoop (perfectly smooth inside and open at both ends) 12 inches high, having a diameter of 7 inches, with a wooden lid or follower fitting closely into it. The mould containing the cheese should have a square block of wood (placed on top of the closely-fitting follower) of sufficient depth so as to be an inch or so above the top. This should then be placed under the press, which is made as follows:—In any well-shaded position from the sun, nail two upright battenings (3 by 1) about 2¼ inches apart, with narrow edges facing position of intended lever lengthwise. In these battenings bore ½-inch holes diagonally, beginning at 11 inches from the floor and working upwards. Then secure the battenings to a veranda-post or any other firmly fixed upright. Then take 10 feet of 2 by 3 quartering, boring ½-inch hole 3 inches from one end, which place between the battenings, putting a ½-inch bolt through the two battenings and quartering, thus forming a lever that will not twist sideways. Place the mould containing the cheese under the lever about 1 foot from the uprights, then put the block on the follower and allow the lever to come squarely on the block. The diagonal holes are made simply to allow the lever to be shifted up or down, so that it may be perfectly level when pressing on the cheese. The weight of the lever alone will be sufficient for first pressure before clothing the cheese. After remaining in the press for half-an-hour the mould containing the cheese should be removed, and the solidified mass shaken out on to a planed board. It may then be clothed in the following manner: A piece of fine muslin (called cheese bandage cloth) is sown like a bag open at both ends and slipped over the cheese, fitting closely, and cut a sufficient length to allow about 1½ inches to be neatly pleated down on either end of the cheese; then place on the end of the cheese a circular piece of calico of sufficient circumference to allow the edges to overlap the sides of the cheese by 1½ inches, after which the mould is slipped about halfway down the clothed cheese, and both cheese and mould turned over on to an oblong zinc tray (three sides of which are turned up about ¼-inch) and the other end pleated in, placing a square piece of calico sufficiently large to cover this end of the cheese (these calico cloths should be removed on taking

the cheese from the press, and can be used again when required). The follower or lid is then put into position, and the mould containing the cheese put under the press, having a weight equivalent to 60 lb. on the end of the lever furthest from the cheese. On the following morning an additional weight of about 40 lb. should be added, and after 2 hours' pressing the cheese is fit to be removed from the press, and should present a smooth surface, showing that the cubes of which it is composed are perfectly amalgamated. It should then be removed to a room having a temperature of not less than 60 degrees Fahr. or above 75 degrees Fahr.; an even temperature of 67 degrees Fahr. being the most perfect for curing cheese, and of sufficient dryness to prevent the cheese turning mouldy. After being turned and wiped, say twice a day, during the first week, and once a day during the succeeding weeks, at the expiration of two months the article is fit for consumption.

The following is Mr. Baron Jones's recipe for making rennet:—

Use rennets from calves not more than eight days old. Turn these rennets inside out and wipe dry with a clean cloth; after turning back blow them out like a bladder and hang up in a dry place for 2 weeks away from fire or sun; they can then be used as follows, viz.:—Take seven rennets and cut them into strips like shoe laces; have ready boiled and thoroughly cooled 5 gallons of water, in which place the cut up rennets in a *stone* jar, adding sufficient salt to leave always a little undissolved in the bottom of the jar. Stir or rub occasionally, and in 3 or 4 days the preparation will be ready for use. One pint of the above should be sufficient to curdle 40 gallons of milk in 40 minutes. But rennets sometimes varying in strength, more or less of the preparation will be necessary to obtain the desired result, which should be arrived at in not less than 40 minutes, or more than 50 minutes. It is almost needless to add that strict cleanliness is necessary at all times in preparing this mixture. The above is simply a standard recipe; a smaller number of rennets can be used in the same proportion.

ABOUT GOATS.

The town goat is acknowledged on all hands to be an unmitigated nuisance. But when we come to consider the goat as a factor in rural pursuits, we shall find that this animal is capable of raising up a very profitable industry in the bush.

The wilder and more mountainous the country, the greater profit is to be derived from rearing goats. In Queensland we have thousands of acres of rough, mountainous country, usually well grassed and rich in shrubs, which afford ample nutriment to such omniverous animals as goats.

They are not over-anxious about a water supply—in fact, copious dews such as we have about the Main Range will be sufficient for their needs in this respect, although there are many running creeks and many springs in all our ranges. The common goat is very cheap, but he and his wives are capable of affording a good living to the goat farmer. The skins of the adult and of the kid are marketable commodities. The flesh of the young kid is far superior in tenderness and delicacy of flavour to that of the lamb, and the hair of the more valuable Angora is of great commercial value.

This is what a Texas (U.S.A.) man says about Angoras, in the *Pacific Rural Press*:—

Brush Bouncers.—The present interest in Angora goats is due chiefly to their merits as brush exterminators. They are likely to become one of the largest stock-raising industries on that account, and every progressive farmer should thoroughly investigate the Angora goat. As scavengers their value is inestimable, and in every instance of experiment they have accomplished even more than was expected of them. There is nothing in the way of vegetation that cattle refuse to eat that a goat will not eat with a relish; hence the value of them. A farmer must labour for what he feeds his cows, and ten or twelve

goats can live on what it takes to keep one cow. But the best of all is their peculiar appetite for brush. There is no kind of brush known that a goat will not eat if he can get at it, and they are capable of climbing leaning trees and heavy brush with the greatest of ease.

If you desire to kill out young trees or saplings, you can quickly accomplish the task by chopping the tree so that it will fall. It is better to chop part way and then break them down. This leaves the roots connected to some extent with the foliage, and the goats will eat the leaves, which invariably kills the tree, roots and all. Should any sprouts come out in the following spring, the goats will make quick work of their destruction; and so it is with any class of vegetation that they can get at.

BRUSH RANGES.—Some people say, Why is it the goats do not eat out the range in the mountains? Simply because there are not enough goats to the acre. You can have an Angora goat farm, and always have brush feed for them every year. But to do so you must have one acre of brush land to every goat. In this way the goats are not sufficient to kill the brush; but put two and a-half to three goats to the acre, and you can accomplish an amount of grubbing that is incomprehensible until you see it done. It will no doubt be the means of clearing some of the millions of acres of land that could be cultivated, were it not for the heavy growth of underbrush thereon.

FENCE FOR GOATS.—Almost everyone has a mistaken idea about fencing land to hold the goats, some believing that a 5-feet poultry netting is the least height that will keep them within their bounds. It is true they are very agile, and, when scared, will sometimes clear a 3-feet fence with ease. A fence 4 feet high will keep them in perfectly, but the great trouble with barbed wire and board fences is that the goats will crawl through or under the fence. The best fence is a strand of 21-inch hog wire and four strands of barbed wire, the top wire being 4 feet from the ground. This kind of fence will be sufficient to hold your goats securely, and as long as you want them.

Angoras, as well as sheep, can be kept year in and year out, day and night, and do better than under the best herder. They are entirely at their ease; they will grow larger and fatter, and bear more mohair or wool than in any other way, and pay for the full cost of the fence in a very few years. Of course, they would need sheds to protect them against rain. Should part of such mountain brush land have to be reserved for a larger growth, it should be partitioned off until large enough to have hard and rough bark. Then some good woodsman could cut off with the ax or brush hook the smaller ones, and the goats will then only touch the young shoots, as long as there are enough of them to feed on. In this way they would rather be an advantage than a detriment to forest growth, as they would keep the woodlands clean and less exposed to damage by fires.

The number of Angoras which can be kept on an acre varies with the size, character, and density of the brush, and may vary from four or five acres to each Angora goat to eight and ten Angoras for each acre, and can only be determined by actual experiments.

Though not nearly as many can be kept to the acre, they really do best well-protected forests, with small undergrowth, and it is on such land that the reach their highest perfection in Asia Minor.

ADVANTAGES OF GOAT-KEEPING.

The industry combines pleasure and profit with a minimum amount of labour. Where sheep and cattle would starve, goats will not only live, but fatten and yield ampler supplies of a milk which far surpasses cows' milk in richness and ease of digestion, for which latter reason the milk of the goat is eminently suitable for invalids and young children. Whilst the amount of butter fat in the milk of the best cows does not average over 4 per cent.

and other solids about 8 per cent., the butter fat in goats' milk averages 7·30 per cent. and other solids about 10 per cent. Again, the average percentage of water in goats' milk is 83·21 per cent., in cows' milk 87·56. The former, however, must yield to the latter in butter production, but for cheese-making it is unrivalled. In France and Switzerland some of the most famous and fashionable cheeses are made from it. Large flocks of goats are kept in the mountainous districts of these countries, where they look after themselves. Like cattle on an Australian station, they have their favourite camping and feeding grounds, and only roam within certain limits, and at the sound of the shepherd's horn they assemble round him like a docile pack of hounds. We cannot call to our recollection that goats in these countries ever suffered from any disease. Living in the mountains, and generally in the driest and stoniest country, they are free from anything in the shape of foot-rot; neither worms, nor catarrh, nor lung disease trouble this hardy animal, so long as it is confined to high dry country. On low coast lands it suffers from the damp. In Switzerland, whilst some of a flock are milked in the morning, the majority are not milked till mid-day, as it has been found that the milk is then richer than the early milk.

Another great advantage in keeping goats is in the matter of feed. The cowkeeper has to feed his cows on certain classes of forage, such as lucerne, green barley, green maize, pumpkins, mangolds, &c., and has also to prepare for failures and dry seasons by making ensilage for them. His cows will not eat any kind of rubbish in the shape of weeds, although we have frequently seen them eating the prickly pear, which goats do not care for.

The latter, on the other hand, will rid the land of a great number of noxious plants and shrubs, eating even poisonous ones without any ill-effects, and after a couple of years the land which has thus been cleaned by the goats will be carpeted with a close growth of couch grass as a general rule, that being the grass which, on our coast lands, makes the first appearance on any spots which have been denuded by fire or from any other cause.

The people of the United States of America are amongst the largest buyers of goatskins. The rural journals of that country are constantly advising people who have dry, rocky, waste hill country to enter upon the goat-breeding industry; but, notwithstanding its great advantages, and the profit derivable from it at a minimum expenditure of capital and labour, the industry does not advance. The *Florida Agriculturist*, in a long article on the economic value of goats, says:—

Goat-keeping pays excellently under circumstances where conditions are not favourable to grazing cows. There are several kinds of goats, but the three chief varieties in Jamaica are—good, bad, and very bad, principally the two latter. Pure Angoras are excellent milkers, and Angoras crossed with common varieties produce really valuable animals, more especially if care be taken in the matter of choosing good milkers for breeding from. Goats reared and kept as milch goats want good feed, and to be allowed to forage in clean places where access cannot be had to undesirable feed. For skins and flesh they may forage anywhere.

Breeds of Goats.—It is only during the last twenty-five years that any steps have been taken in Europe to improve and classify the various breeds of goats. The first British show of goats was held in 1875. The British Goat Society, organised in 1872, now has a herd-book which contains over 700 entries. The goats found in Great Britain are a mixed breed, made up by crossing native goats with Nubian, Toggenburger, and other breeds. The Nubians are distinguishable by their drooping ears, and being good milkers have been used freely on the native British goat, and many of the best goats in that country are now largely of Nubian blood. The Toggenburger breed comes from Switzerland, where milk production in goats is sought for as much as possible. They are of mouse colour, hornless, have erect ears, and light band down each side of the face and on the lower parts of the legs.

Crosses of this breed have figured largely at goat shows in England. Both Nubians and Toggenburgers are short-haired goats. Then there are Welsh or rather Irish goats, which are rough-haired and horned and are almost worthless for milk production. From Malta comes the white Maltese goats, some of which are extraordinary milkers. In Germany five goats are kept to every hundred of the population; and they are also largely kept in Italy and Greece, in the mountainous regions where no other live stock would thrive. In Syria and parts of France, the dairymen drive their goats round to their customers' houses and milk them before their doors, the customer, if he has any preference, designating which goat he wishes milked. There has never been any standard points drawn up for the British goat; inasmuch as a great variety of types in colour, size, and as regards horns is always to be found, the practice has been followed at exhibitions of ignoring purity of breed, the prizes being offered with a view to encourage the selection of the best milkers, irrespective of breed. In general ways the point aimed at are—Size; a fine smooth coat of short glossy hair; horns, if any, to be as small as possible, dark in colour, and to curve backwards; the female to be of the same distinguishing types as cows of a dairy herd—viz., wedge-shaped, and carrying large and shapely udders and teats, the udder to be soft and elastic and not fleshy, the teats to be nicely tapered, set far apart, to be from 2½ to 3 inches long.

But not only is the goat an economic animal for the household from a milk point of view; it is valuable in many other ways. For instance, the United States use in manufactures a constantly increasing amount of goat-skins, but produce comparatively none. Last year over 32,000 tons, or 65,000,000 lb. of goatskins, were brought in, chiefly at New York; and the average price in New York was 40 cents per lb., or a total value of 26,000,000 dollars. At 4 lb. to the skin, the average weight in dry skins, it requires the slaughter of 17,226,700 goats and kids to yield the skins imported last year. This represents live flocks of foreign goats aggregating from 25,000,000 to 30,000,000 for our present supply of marketable goatskins alone. If all the goats in the United States were kept solely to supply skins for market, they would fail to supply even an insignificant fraction of the present demand. In goat-keeping on a large scale, it is not alone the skins and fleeces that enter into the profit account. If the skins imported last year represented native stock, there would have been taken additionally into the United States market and profit account nearly the whole animal—the flesh, tallow, bones, hoofs, horns, &c., which together would constitute more than half the entire marketable value. Besides, there is to be derived from the mature females, as we have pointed out, during much of their lives some value in milk for market or household uses or for conversion into the most saleable varieties of cheese, such as Roquefort, Mount D'Or, Le Sassenage, and Levroux, of France and Switzerland. So fully is the goat available as a dairy animal when bred to that object, that in Europe it is sententiously called "the poor man's cow," because of the combination of value with economy of keeping. The cost of keeping goats is less than for any other animal. They graze upon coarse herbs that are not eaten by any other stock. The wool of the Angora variety possesses the highest felting qualities. The average fleeces from mature Americanised Angora bucks weigh from 6 lb. to 7 lb., and those from ewes from 3 lb. to 4 lb. The flesh from the crosses is accounted superior to sheep mutton in many countries.

The ease with which all breeds of goats can be kept fits them for many mountainous portions of our country, where sheep cannot be sustained to advantage, while their ability and disposition to defend themselves against dogs give to them another great advantage over sheep.

THE ANGORA GOAT.

E. H. Jobson, secretary of the Sierra County Goat and Sheep Growers' Association of New Mexico, says in the *Shepherd's Bulletin*: The Angora goat is probably destined to become one of the most valuable of the domestic animals,

and the recent manifestations being shown in behalf of them are something that they have long deserved, and the growers of goats have quickly grasped the opportunity to demonstrate the merits of the goat, and they have now almost entirely abolished the prejudice which has so long existed against the Angora venison as a food.

There are more goats in this immediate vicinity than there are in any other one community, there being nearly 18,000 head, ranging from 300 to over 2,000 head in each flock. The average price obtained for our mohair, for a six months' clip, was 23½ cents per lb. This is a good average, and is self-evident as to grades of our goats.

There are four growers of goats who are paying special attention to the breeding of fine stock, and the result during the past three years has developed some very fine stock, and for which good prices have been obtained.

In the writer's opinion, there is a great future before the Angora goat, because of its many fine points, and the valuable uses that can be made of them on a farm. The hair from an Angora goat makes a fabric that rivals that of the silk. A good goat will produce from 4 lb. to 6 lb. of this class of mohair, which ranges in price from 25 to 40 cents per lb., according to the length, quality, and lustre of the hair.

The most valuable service that can be had from an Angora goat on a farm is in clearing brush land. There is nothing that kills brush and trees quicker than the constant nibbling away of the tender leaves and bark, which constitutes the best food for a goat, although they will eat any class of food that is fed to domestic animals. There is no reason to believe in the world why the Angora goat venison should not be considered as dainty a meat as that of the deer. If the health of an animal is a criterion as to the purity of the meat, there is no meat as pure as that of the Angora goat.

PIG-FEEDING.

GOOD RESULTS FROM PASTURE.

From experiments made in the States, it was proved that pigs actually made a greater increase of weight when they had the run of a grass and alfalfa pasture, and full ration of grain, than did the pigs which were confined in a yard, and fed with all the green food they would eat, and the same quantity of corn as those pigs at pasture. The results showed that the pigs at liberty made a daily gain of 1·3 lb., and required 417 lb. of corn for 100 lb. gained, whilst those pigs which were kept shut up made a daily gain of 1·1 lb., and needed as much as 465 lb. of corn to make an increase of 100 lb., or a difference in favour of the pigs which were at grass of some 10 per cent. It was also clearly proved that considerable benefit was derived by the grazed pigs from the green food, and when a reduced quantity of grain was fed to them, they actually consumed only 377 lb. during the period they increased in weight 100 lb. This value of green food for pigs was also clearly proved by a number of pigs which showed a daily increase of ·36 of a lb. per day, or 2½ lb. per week when no grain was fed to them, whereas another lot of pigs, which were confined in a yard, and had an unlimited supply of green food carried and fed to them, lost weight to the extent of ·26 of a lb. per day. This proof that pigs can be profitably and successfully kept on grass need not surprise us when we consider that for many months in each year the wild pigs are compelled to be herbivorous animals; and if the wild pig can convert grass into pork, surely our improved pigs should be equal to the task.

In some parts of Kent, Somersetshire, Cambridgeshire, and other counties where fruit-growing is general, it has become the fashion to graze the, orchards with pigs instead of with cattle or sheep. The pigs do not in any way harm the trees, which actually produce a considerable increase of fruit

owing to the additional fertility of the soil due to the excreta of the fatting pigs being generally deposited under the trees, or on exactly the portion of the orchard where the greatest manurial benefit can be derived. The herbage of the orchard is also very greatly improved if it be grazed by fatting or even growing pigs than if fed by other stock. The fruit trees also furnish exactly that kind of shelter which is needed in hot weather by fatting pigs; the rays of the sun are powerless to scorch the pigs, and the summer heat is tempered by that current of air which is seldom absent under the trees in an orchard. It may be said that, in the majority of cases, the soil is sufficiently rich to produce a good crop of fruit. That this last is not always, if generally, the case, was pointed out by a large fruit-grower in Kent, who related his experiences of pig-fatting in his orchards. He declared that not only did he get a heavier crop of cherries after having fattened pigs among his fruit trees, but that the fruit was finer, and, of course, of more value on the market. When asked as to the cost of this application of fertility to the soil in the form of pig manures, his reply was that he realised a direct as well as an indirect profit from his pig breeding and feeding.

FEEDING THE BREEDING SOW.

In rearing pigs for fattening a great deal depends upon the constitution and qualities of the sow. The question of breed we need not touch upon, but in so essentially a fattening animal as the pig, and whose food is always given to that end, there may be a tendency to forget that in rearing breeding sows the object is not to fatten them, but enable them to develop healthy frames. The constitution of the dam is transmitted in great measure to her offspring, and, this being kept in mind, the necessity for careful rearing of the young sow will be apparent. The food should be rich in bone and muscle forming material, and that which is only rich in starch and sugar should not be given to any extent. Skim-milk should be given where obtainable, and bran, pea, or bean meal and oats may be given in addition, and young clover and grass are excellent. When we consider the number of pigs at a litter, and that all of these depend for their success upon their dam, it will be seen that too great stress cannot be laid on this. After the breeding sow is fairly well grown, her food should never be such as to cause her to lay on flesh. During the earlier time of pregnancy she will spend most of her time running through the orchards or on the meadows, getting some wash, and as time goes on she will receive sharps in addition. About three weeks before her time she will get better treatment, some bran, brewers' grains where obtainable, and perhaps a little meal being the additional food.

FEEDING FOR CONSTITUTION.

The drain upon the system of the sow during the period the young are suckling is very great. It has a larger litter of young, all of whom are increasing at a rapid rate; and as all this increase comes from the milk of the mother, it represents a demand on the sow which must be met by a liberal supply of food.

Brewers' grains, with shorts and bran, and a little oatmeal are strongly recommended, and if skim-milk is to be obtained, so much the better. At about three weeks old the pigs are induced to take skim-milk with a handful of shorts or bran mixed in it, away from the sow, and softened grain may be thrown to them; when about seven to ten weeks old they are finally weaned. Many large pig-keepers prefer to keep them the full ten weeks on the sow, as it gives them a much better start. In this case they do better in subsequent feeding, or, if sold as slips immediately, fetch better prices. If the youngsters are to be kept for fattening (which in view of the fluctuations in price of young pigs is generally the best plan), it is best to keep them going from the beginning. The young pigs want a good start in the shape of developing bone and muscle, and the food should be arranged accordingly. Skim-milk with shorts and bran is excellent as affording plenty of material for bone and muscle, also a sufficiency

of fattening material. If skim-milk is not available, oatmeal bran and maize-meal in equal proportions with wash, or cooked and given as gruel, are recommended. Maize or Indian meal should not be given to young pigs without other meals being mixed with it, nor, indeed, to pigs of any age. Professor Stewart, a great American authority on feeding, says that hog cholera (which is such a frightful scourge in the States) is due in great measure to the indiscriminate use of maize, especially in the feeding of young pigs, and he mentions the case of two pigs fed on this food alone, which at 136 days were mere balls of fat, and so weak that they could not stand; and their weight was at least 40 lb. less than what it would have been had they been fed on a better-arranged food. He gives skim-milk and maizemeal as an excellent food in the proportion of one quart of skim-milk to 1 lb. maize. We should prefer to see a little bran added, as supplying more bone-forming matter. It would then be a better ration than the one in commoner use of skim-milk, bran, and shorts.—*Farmer and Stockbreeder.*

LICE ON SWINE.

Lice on swine (says the *W.A. Journal of Agriculture*) are generally caused by poverty, or through the stock being badly kept. The best remedy is: Pour about 1 gill of kerosene oil in any old dish, and with a paint brush or old woollen rag rub the oil up and down the back of the animal, behind the fore-legs, and on the flank; be particular about the last two places, for it is where the lice deposit their eggs, which, if not destroyed, will hatch out in about five days. If it be a black pig, these eggs can be plainly seen, being about the size of timothy seed, and laying close to the skin fast to the hair. You need not fear to use the oil freely, as it will not injure the pig in the least.

A BUTTER PACKAGE OF GLASS.

Some shipments of butter have been made from Melbourne to Kimberley, packed—not in the ordinary wooden butter boxes, but in packages of glass. The United States Consul at Magdeburg has drawn the attention of the State Department to this novel departure, and states that this method of packing has already been extensively adopted in Australia. But in this we can say there is some mistake on the part of the Consul's informant, as glass butter boxes are not in use at all in Australia. The shipment referred to was probably an experiment which would certainly not pay exporters to adopt. In the first place, wood is extremely cheap in Australia, and all butter boxes are cut to one pattern at the various sawmills. Glass has to be imported, and, consequently, would be too costly a material for packages, even if it were not so fragile and brittle. A broken glass butter package would render necessary the destruction of the butter. The box is thus described in an American journal:—

It is formed of six plates of ordinary window glass whose edges are closed with gummed paper; the glass box is covered with a layer of plaster of Paris, about one-fifth of an inch thick, and is then wrapped in specially prepared waterproof packing paper. As gypsum is a bad conductor of heat, a regular temperature is maintained within the glass box. At present the cases are made of sufficient size to contain 100 kilograms (220 lb.) of butter. Mr. Murphy (the Consul) thinks this idea may prove of special value to firms in the United States engaged in shipping butter and other articles to tropical countries, especially if the question as to the proper size and construction of the boxes be given additional consideration. It seems likely, moreover, that this system of protecting delicate articles may be found useful even in the home market.

DAIRY HERD.

QUEENSLAND AGRICULTURAL COLLEGE.

RETURNS FROM 1ST TO 30TH SEPTEMBER, 1900.

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.			
Blink ...	Ayrshire	21 Mar., 1900	695	3·6	28·02	
Bonnie ...	,, ...	17 April ,,	445	3·9	19·43	
Laverock ...	,, ...	7 Dec., 1899	405	3·8	17·23	
Linnet ...	,, ...	15 May, 1900	712	3·5	27·91	
Lavina ...	,, ...	6 April ,,	766	3·8	32·60	
Rosebud ...	,, ...	10 April ,,	878	3·6	35·4	
Annie Laurie*	,, ...	30 May ,,	967	3·7	40·07	
Ream ...	,, ...	24 July ,,	852	3·6	34·35	
Isabelle ...	,, ...	7 July ,,	697	3·7	28·88	
Lena ...	,, ...	13 July ,,	884	3·5	34·65	
Laura ...	,, ...	28 Aug. ,,	688	4·4	33·9	With first calf
Leesome* ...	,, ...	1 Sept. ,,	844	3·5	33·08	
Ream Routhie	,, ...	20 Sept. ,,	188	3·7	7·79	
Effie ...	Jersey	16 Dec., 1899	248	5·0	13·88	Dry, 30-9-00
Jersey Belle	,, ...	21 May, 1900	672	5·2	39·37	
Opale ...	,, ...	16 Dec., 1899	74	6·0	4·97	Dry, 14-9-00
Content ...	,, ...	18 July, 1900	663	5·0	37·12	
Playful* ...	,, (Grade)	14 July ,,	851	4·3	40·98	
Baroness ...	,, ...	3 Aug. ,,	755	5·2	43·97	
Carrie ...	,, ...	18 Aug. ,,	615	4·4	30·3	With first calf
Spec ...	,, ...	26 Aug. ,,	542	4·4	26·7	With first calf
Stumpy* ...	,, ...	29 Aug. ,,	933	4·2	43·88	
Eveleen ...	,, ...	2 Sept. ,,	574	4·1	26·35	
Beatrice ...	,, ...	3 Sept. ,,	432	4·5	21·77	
Connie ...	,, ...	8 Sept. ,,	380	4·3	18·3	
Cherry ...	Shorthorn ...	19 Feb. ,,	315	3·7	13·04	
Gladdy ...	,, ...	2 May ,,	778	3·6	31·36	
Hilda ...	,, ...	25 May ,,	572	3·7	23·7	
Louisa ...	,, ...	6 April ,,	665	3·5	26·06	
May ...	,, ...	20 May ,,	671	3·6	27·05	
Nestor ...	,, ...	21 April ,,	588	3·7	24·36	
Folly ...	,, ...	15 May ,,	244	3·8	10·38	
Spot ...	,, ...	11 Sept. ,,	417	3·7	17·28	
Kit ...	,, ...	28 Sept. ,,	24	4·0	1·07	
Brush ...	,, ...	28 Sept. ,,	19	4·2	·89	
Plover ...	,, ...	3 July ,,	812	3·5	31·83	
Guinea ...	,, ...	20 Feb. ,	542	3·7	22·46	
Queenie ...	,, ...	29 April ,,	572	3·7	23·70	
Frizzy ...	,, ...	23 Aug. ,,	788	3·4	30·0	
Alice ...	Grade Shorthorn	13 Nov., 1899	352	3·8	14·98	
Eva ...	,, ,, ..	18 May, 1900	580	3·8	24·64	
Polly ...	,, ,, ...	29 Jan. ,,	442	3·6	17·82	
Rusty ...	,, ,, ...	17 Jan. ,,	368	3·8	15·66	
Stranger ...	,, ,, ...	7 July, ,,	814	3·6	32·83	
Ball ...	,, ,, ...	14 Aug. ,,	533	3·8	22·68	
Duchess ...	,, ,, ...	24 Aug. ,,	780	3·6	31·44	
Restless ...	,, ,, ...	3 Sept. ,,	665	3·8	28·2	
Rosella ...	,, ,, ...	5 Sept. ,,	484	3·9	21·14	
Lucy ...	,, ,, ...	27 Sept. ,,	35	3·8	1·48	
Leopard ...	,, ,, ...	29 Sept. ,,	14	3·9	·61	
Pet ...	Grade Jersey ...	14 Aug. ,,	611	3·6	24·63	
Redmond ...	Grade Shorthorn	12 Sept. ,,	387	3·5	15·17	
Fancy ...	South Coast ...	21 May ,,	780	3·7	32·32	
Damsel ...	Holstein ...	5 Dec., 1899	371	3·3	13·71	
Dairymaid	,, ...	15 May, 1900	811	3·0	27·24	

The whole of the herd, with the exception of those marked *, were grazed on natural pasturage. Cows marked * are being fed for experiment purposes, and results will appear on completion of tests.

The Horse.

DISEASES AND DISORDERS OF THE ALIMENTARY SYSTEM.

By W. C. QUINNELL, M.R.C.V.S.L.

With a few rare exceptions, diseases of the digestive apparatus result from errors in dieting, it is, therefore, very essential that the food supply to horses should be well and thoroughly attended to.

Of all equine maladies, disorders and diseases of the digestive organs are most commonly encountered. It may be useful in the first place to describe very briefly the mechanism of digestion in the horse—*i.e.*, the various processes, agents employed, and effects on food from its reception by the mouth to its final evacuation.

The different steps of digestion are :—

Processes.	Agents Employed.	Effects.
I. Prehension	Flexible lips and incisor teeth ...	Transferring the food to the mouth.
II. Mastication	Tongue, cheeks, and molar teeth ...	Worked about by the tongue and cheeks, and is carried by their action to the back teeth or grinders, and food is triturated.
III. Insalivation ... ... (Salivary digestion)	Salivary glands	I. Mechanical action, by lubricating the bolus of food. II. Chemical—converts starch into sugar.
III. Deglutition ... ... (Swallowing)	Muscles of throat and gullet ...	Passage of food from mouth to the stomach.
IV. Gastric digestion ... (Chymification)	Stomach and its glands	The gastric juice changes starch into sugar, not of itself, but by the saliva; which still continues its action, converts vegetable albumin into peptones, and digests cellulose by fermentation to some extent.
V. Intestinal digestion ... (Chylification)	Intestines, small and large; Liver and Pancreas, with their secretions— (A) Intestinal juice (B) Bile (C) Pancreatic fluid	Fats rendered soluble, nitrogenous foods dissolved, and starch converted into sugar.
VI. Absorption	Lymphatics and Veins	Food principles after digestion enter the circulation.
VII. Defecation	Terminal portion of large intestine—Rectum; and the posterior opening of the Alimentary Canal—Anus	Expulsion from the body of the residue not required for alimentation in rounded balls as fæces.

Such is the preparation and course of the *food;* but the course of *water* through the body is somewhat different. *Liquids* may be taken in by—(*a*) *Sucking* in the young; (*b*) *pumping*, piston action of tongue; (*c*) *aspiration*, by an inspiratory movement. The second is the most often used by the horse.

Water does *not* lodge in the stomach, but merely passes rapidly through it, and through the small intestines on its way to the *cæcum* or blind gut (an elongated sac, 3 feet in length, with a capacity of 7½ gallons). From the *cæcum* the water is gradually taken up by the veins and absorbents, in accordance with the requirements of the system.

Professor Williams points out the important fact that *easily digested food* taken by animals in excess is liable to derange the *small intestines;* whereas *coarser* and more *indigestible food*, containing much woody fibre, such as over-ripe hay, rye-grass, and coarse straw, is more apt to accumulate in the *large* intestines, thereby causing disordered action, inflammation, or even paralysis of the intestinal muscular tissues. *Boiled food* is also apt to be retained in the *stomach*, and if given in excess it is liable to cause distension, inflammation, or even paralysis or rupture. It is, moreover, not only the bad quality of the food which may produce disorders in the alimentary tract, but irregularity in diet and full feeding after exhaustive work may also be very liable to cause disease. The capacity (3 to 3½ gallons) of the horse's stomach, and its weight

when empty, only 3 to 4 lb., is remarkably small in comparison to his frame; he therefore requires to be fed frequently, and the food should be taken in the following order: *First*, water; *second*, hay; *third*, oats; as the water, if given last, would wash the food into the intestines before it was acted upon by the gastric juice, while, if hay were given *after* oats, it would carry them along with it as it is principally digested in the intestines, the oats being acted upon by the stomach for the most part. The stomach is never completely empty, as some food remains after the lapse of twenty-four hours.

DISEASES AND DISORDERS.

Mouth.

Lampas.—Congestion of gums and palate of horses from teething and gastric derangement.

Symptoms.—Inflammation and swelling of the anterior portion of the palate. Soreness of the palate usually causes the animal inconvenience in taking his food.

Frequently the inflammation causes slight febrile symptoms.

Treatment.—Place the animal on wet bran and soft food for a few days.

When swelling is excessive and painful, carefully scarify the palate with a lancet.

Since Lampas is only a trifling ailment peculiar to young horses, the practice of burning the palate with a hot iron is not only unnecessary but brutal.

Stomatitis.—Inflammation of the mouth, chiefly in young animals.

Symptoms.—Inflammation giving rise to special formations—

(*a*) Simple or catarrhal stomatitis
(*b*) Vesicular stomatitis
(*c*) Pustular stomatitis

affecting the buccal membrane of the cheeks, around the angles of the mouth and the tongue.

They first appear as small circumscribed red areas (simple stomatitis) chiefly met with in foals, or as small vesicles (vesicular) which rupture and leave minute ulcers; or again as small yellowish patches, which develop into pustules (pustular stomatitis).

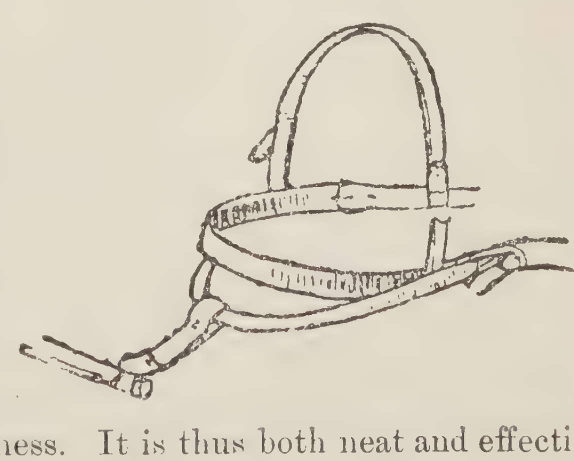
Treatment.—Careful feeding, laxatives, salines, remove gastric derangement with which many cases are associated.

In suckling foals, besides local treatment see that the mother's milk is sound

Ulcerous spots should be dressed with borax or with silver nitrate.

DEVICE FOR DOUBLE HARNESS.

It is often desirable to hitch up a double team with light single harnesses where regular double harnessess are not at hand, or if at hand are, perhaps, too heavy. The special objection to using a breastplate in a double rig has been the difficulty of so attaching it to the yoke that the horse might hold back the load easily. The accompanying illustration shows a device recently seen in use that tells its own story. The extra attachment in front passes back and connects with the breeching, giving the same power to the horse in holding back the load that he has when used in single harness. It is thus both neat and effective



Poultry.

A SUCCESSFUL POULTRY FARM.

Mr. J. Bunnage, Gracemere, writes:—It has been very pleasant and profitable to me to read from time to time of others' experiences and successes with poultry in your valuable journal, and, as I breed between 200 and 300 purebred poultry every year myself, I thought it might be of some use to others to give some of my experiences. During the breeding season all my birds are in pens, wire-netted, top and sides, and all the food the birds get has to be given to them. The size of the pens is 33 feet long by 10 feet wide. In one of these pens I put three single-comb Black Orpington pullets and one cock. Early in June they started to lay (about 15th June), and they laid 34 eggs in June. In July they laid 65 eggs, and in August they laid just the same number—65—and are still laying. Out of that number I put into the incubator 93, and 88 of them proved to be fertile, altogether disproving the statement so ofttimes made that fowls cannot be kept healthy and vigorous in small runs. It is true that very much depends on how they are cared for. My style of feeding and caring for them is this: About sunrise I give them a scanty breakfast of one-third corn, two-thirds wheat, thrown into litter 3 or 4 inches deep. They scratch at this most of the morning, finding their food gradually, which is more natural than getting a large feed in a few minutes, then standing hulked up in some corner. It is a much better way of keeping your fowls warm on cold mornings than giving them a steaming hot mash of pollard, which only makes them more sensitive to cold after a few minutes.

The next meal is about noon, when I give them green feed chopped up every other day, and the neck of beef chopped up, bone and all, every other day. I prefer lucerne to any other green feed. I have tried it both for young and full-grown fowls; it gives the yolk of the eggs a high colour, which is very much sought after by some people, and it helps to maintain the fowls in good health. At about 5 o'clock in the evening I give the evening meal of wheat and corn, with this difference—that I give all I think they will eat. Occasionally I give a feed of pollard at night instead of grain. I always have a tin of coarse, clean, sharp sand in each pen, and plenty of clean water, and pay close attention to cleanliness.

[We hope to receive further useful information on the poultry industry from Mr. Bunnage, who is clearly working his poultry farm on right business lines.—Ed. *Q.A.J.*]

REARING TURKEYS.

Opinions vary considerably as to whether turkeys are profitable or not. Some people who have given them a trial state that they pay well, and that they are not more delicate than other fowls, while others contend that they can scarcely rear any. That they are grown largely in America should be taken as a proof that turkeys are profitable under certain conditions. They require care and attention, as do most other young things, during their early chickenhood, when frequent feeding and shelter from cold winds, rain, and hot sun are necessary.

Having arrived at the point of developing the red skin and excresences on the head and neck, at about eight or twelve weeks of age, they are quite hardy. They can stand rain and storms with impunity, and can roost of a night on trees or on open railings without any ill effects. If they do sleep indoors, they should not roost in close, stuffy, or badly ventilated houses. This is often the case, with the result that the young birds contract roup and other

diseases, dying off in large numbers, and getting the character of being delicate and difficult to rear. If they are driven under shelter at night, a shed with a wire front will be found as good a place as any. This must have some broad perches, so as to obviate the chance of crooked breastbones.

The weight of a big bird like a turkey makes it important that the perches should be carefully seen to. When they roost on the trees they can choose branches of a suitable size, and crooked breastbones are seldom met with in birds that have found their own roosting-places. The finer and larger the poults are, the more likely will they be to suffer if allowed to rest on narrow perches while their bones are soft.

The feeble appetite possessed by the quite young turkeys disappears entirely when they have acquired the red appendages. They will then eat freely and readily, and should increase in size at a great pace. After the corn is cut, they will, to a large extent, find their own living on the stubbles. It should be remembered, however, that the poults should be induced by every means to grow as large as possible. Small, undersized turkeys are worth very little, while large, well-fed birds will realise infinitely more in proportion. So it is no economy to stint the food. A good feed of meal in the morning brings them along fast. Barley-meal, to which a little bonemeal is added, is an excellent diet. And they should go to roost with their crops full of grain, such as wheat or oats. Maize is apt to make the flesh yellowish, and this diminishes their value for the table. Turkeys that are to be seen in the Christmas markets of exceptionally large size, are usually birds that were hatched in the previous year.

FOWLS FOR THE TABLE.

The production of chickens for table purposes attracts a good deal more attention now than it did a few years since. Many persons who are desirous of trying to breed fowls for eating are seeking information as to the class of bird with which they should commence. There is no question that it is infinitely more profitable to grow first-class table chickens than moderate or inferior ones. Complaints are often heard from farmers and others who take no trouble to have good stock that it does not pay to rear fowls for the table. There is certainly no demand for the wretched little wasters that are too often to be seen. Such chickens do not pay to rear, and are often unsaleable. But really good-sized, well-fed chickens, properly prepared for the market, are always in demand.

The qualifications sought for in the best table poultry are plumpness of breast, whiteness of skin, absence of offal, smallness of bone, and fineness of quality. Heavy-boned and heavy-legged fowls should be avoided. The breeding stock to produce the desired result should consist of birds that have plenty of meat in the right place, that have good quality of flesh, and whose offspring will be hardy, mature quickly, and fatten readily. The hens and pullets to be used for stock should be of deep square shape, with long, broad breast, straight in keel, and with large wings. The cock bird should be deep in the breast, should handle well—that is, be firm and fleshy, not light and feathery—and be alert and active. All the stock birds must be well matured, the cock, for choice, being in his second season. If pullets are used, they should have been hatched not later than March.

We regard to the breed of fowl to be made use of, the best result is generally considered to be produced by a first cross between two pure breeds. A cross invariably promotes early maturity and gives great hardiness. The most valuably pure-bred for crossing purposes is the Dorking, which fowl is the foundation of our best table poultry. Many farmers and poultry-growers object to the Dorking as being delicate, so it is the exception to see this bird made use of. But even if the Dorking be delicate—which is not admitted—crossed with another breed it will produce strong and hardy chickens. The Indian Game, though the flesh is somewhat hard, is a highly useful bird for crossing. It has a lot of breast meat, and when mated with the Dorking

produces perfect table chickens, large, quick-growing, and easy to rear. Chickens thus bred have weighed 21 lb. the couple. This cross can be made either with the Dorking cock and Indian Game hens, or with the sexes reversed.

A splendid chicken for the table results from mating a white-legged Old English game cock with Dorking hens. A cross that met with considerable success in the table poultry section of the last dairy show, where it took three prizes, was that between the Faverolles and the Indian game. A favourite cross, producing large, useful chickens for eating, is the Brahma-Dorking. This should be bred from a Dorking cock and Brahma hens. Amongst the pure breeds, not crossed, Dorkings, Langshans, Wyandottes, Faverolles, and Plymouth Rocks all make excellent table birds.

LEG WEAKNESS IN CHICKENS.

Growing chickens bred from prize stock, particularly of the heavier breeds such as Langshans, Indian Game, Cochins, and Brahmas, are often troubled with an ailment called leg weakness. The first symptom of this malady is a slight lameness, accompanied by a tendency to sink backwards and to rest on the hocks. Directly this is noticed the sufferer ought to be attended to, otherwise it will probably lose the use of the legs completely, and when this happens there is not much chance of a cure. Leg weakness must not be mistaken for rheumatism, in which the joints are frequently enlarged and painful, the feet bent, and the toes contracted. Neither should it be confounded with cramp, when the limbs become stiff and the claws bent.

Cockerels are more liable to leg weakness than pullets, owing to their greater weight and size. They are generally attacked by it after they are half grown, and before they are fully feathered. Young pullets that are free layers are sometimes subject to it. As a rule the cause is the same in both instances —viz., constitutional delicacy, the result either of too close interbreeding, or the exhausted condition of the parents owing to over-exhibiting; breeding from stock that is young and immature; or by overcrowding the chickens into ill-ventilated houses. Immediately any lameness or weakness of the legs is apparent, the bird should be placed in a pen by itself, and in which there is plenty of hay, or clean, well-broken straw.

The soft food should have some bonemeal added in the proportion of about one-eighth. Some underdone meat should be given, and a pill administered morning and evening made of meal or flour, moistened with chemical food, rolled into pellets as large as the fowl can swallow. The bird should be put out on the grass, or in some quiet corner daily for an hour or two, care being taken that the other fowls do not have access to him so as to interfere with or illtreat him. He should be returned to his pen in the afternoon, and not be left out in the damp or rain. Rubbing the legs with turpentine is recommended by some, but external application is of little assistance.

When pullets that are laying are affected, all stimulating food should be discontinued and the birds separated from the others and kept warm and quiet. They should have the pills and be otherwise treated in the same manner as the cockerels. This troublesome malady is but seldom met with if the chickens are bred from healthy vigorous stock; if they are fed on good sound grain and meal; if they have bonemeal mixed with the soft food; and roost in clean, well-ventilated houses. The young birds should never be coddled in the coldest weather, but allowed plenty of air and exercise.

Bonemeal is a great promoter of size and stamina, and can advantageously be given regularly to growing chickens of those varieties in which a large frame is desired. It can be obtained from most corndealers, or can be made by grinding up whole bones into a fine powder. The moderate use of this is beneficial in most poultry-yards, for there are few breeds of fowl in which size is not an important feature. And, in addition to the stamina that bonemeal imparts, it is a great preventive of diarrhœa among the young stock.

TWO PROFITABLE BREEDS.

During the last five-and-twenty years many new breeds of fowl have been introduced, either by importation from other parts of the world, or manufactured by a judicious blending of old varieties. Some of these are undoubtedly a great acquisition—so much so that it is difficult to arrive at a conclusion as to which are the most profitable. There are so many good ones. Owing to the increased interest that is now-a-days bestowed on fowl culture, the ranks of poultry-keepers are constantly being added to, and the question, "Which is the most profitable breed?" is frequently asked. The condition under which the fowls are to be kept would naturally influence the answer. But whatever may be the circumstances, there is no doubt that two very profitable breeds are the Wyandotte and the Minorca.

The Wyandotte, like others of our most useful modern fowls, has come to us from America. It is bred in several colours, viz.:—Silver, golden, white, buff, and partridge The silvers were the first to make their appearance, followed by the golden, both produced, it is said, from a cross between the Brahma and the Spangled Hamburgh. They are exceptionally handsome birds, and, owing to their beautiful markings, were known, when they first appeared in this country, as "American Sebrights." The Silver and the Golden Wyandottes are excellent all-round fowls. They are free layers, especially in the winter, of coloured eggs; they are large, meaty table birds, are very hardy, will stand confinement well, and mature quickly. They are good sitters and mothers, if required for that purpose. Or they are quickly broken of their desire, and soon commence to lay again. The White variety is thought very highly of in America, and it is rapidly acquiring a great reputation in this country. It is as hardy as any fowl in existence, and will continue laying throughout the coldest weather. The Buff Wyandotte, like other Buff fowls, is in great request. It has a cross of the Cochin in its composition, to procure the colour. It is another first-rate utility bird—perhaps a little more inclined to sit than the other members of the family. The Partridge is quite a recent invention, that bids fair to be a great favourite.

The Minorca, though of little use as a table fowl, is probably more universally kept than any other breed of poultry. No only is it commonly to be seen in the yards of town and suburban poultry-fanciers, but it is found equally valuable to the farmer and to all those who look to eggs as the chief source of profit. The eggs are white, and are almost the largest that are laid by any of our domestic fowls. The hens will often average from 180 to 200 eggs each per annum. They are non-sitters, though now and then some strains show a desire to sit. This, however, is the exception, generally arising from a cross with the Langshan, which has been used by some breeders to add size to the Minorca. This fowl is a moderate eater. The chickens do better if not hatched too early in the year; as they mature very quickly, they need not be brought out before the end of April. The large comb of the Minorca renders it somewhat liable to frostbite, if kept in an exposed situation in very cold weather. Greasing the comb will help to prevent this trouble. There is a White variety of Minorca, not very often seen, and not considered so good a layer as the Black.

The above four articles are taken from *Lloyd's Weekly*.

KEEP THEM BUSY.

Hens that go in the corner and sit down should be put to work. In the morning give them about one-third as much food as they can eat, so as to have them hungry. Then get some leaves, cut straw or dirt, and scatter about a teaspoonful of wheat, corn, and oats (mixed) through it. The hens will soon get hungry, and finding one grain will hunt for another. That is just what you want. Give them nothing until night, then feed all they want. Do this every day. Keep them hungry during the day, but feed them well before going to roost, and they will keep well and lay.—*Farm and Fireside.*

THE CARE OF FOWLS IN HOT WEATHER.

The hot days will soon be with us again, and it is our duty to provide shade for our poultry. 'Tis a great mistake—in fact, cruel—to keep fowls in a pen without shade during the hot scorching days of summer.

The house or apartment where the fowls roost will not do for shade. If no trees in pen, some should be grown, and, until the trees are old enough, a good shade can be made with "tea-tree" bark, or even old bags.

Shade is an absolute necessity to keep fowls in good health during the hot weather; cleanliness and pure water should be the fowls' position every day in the year. The poultry-house should be thoroughly cleaned more often than in the cold weather, and roosts kept free from vermin. If the houses have not been already lime-washed, they should be done at once to prevent lice from getting into thousands, when, if done early, few lice will be found.

During the hot summer months the fowls will require plenty of green food if penned. Even on a fairly grassed run they will eat a large amount of cabbage, lettuce, &c.

EARLY PULLETS.

All poultry-raisers should endeavour to raise early pullets—that is, pullets to produce early eggs next year when eggs are scarce. If pullets are to be hatched, the eggs to produce them should be incubated at once before it is too late. Too early hatched pullets will start to moult when we wish them to lay eggs. All chickens intended for early laying should be fed extra well, and pushed along as quickly as possible. I do not mean that spice or forcing foods should be used, but sound plain foods as much as they will eat. The housing should be attended to, for pullets allowed to sleep out or care for themselves will not make an early layer. The chief points are to keep them warm at night, a fair amount of exercise during the day, the proper kind of food, and to be from good laying parents. Some breeders attend well to the birds in the chicken stage, and when the birds are near maturity they get careless, and think that their duties are over, and only have to wait and collect the eggs. This is wrong; and good food and labour lost. To have good pullets, that will grow into good hens and make good layers, there must be no "stop" in our care for them.

STRANGE USE FOR HENS IN CHINA.

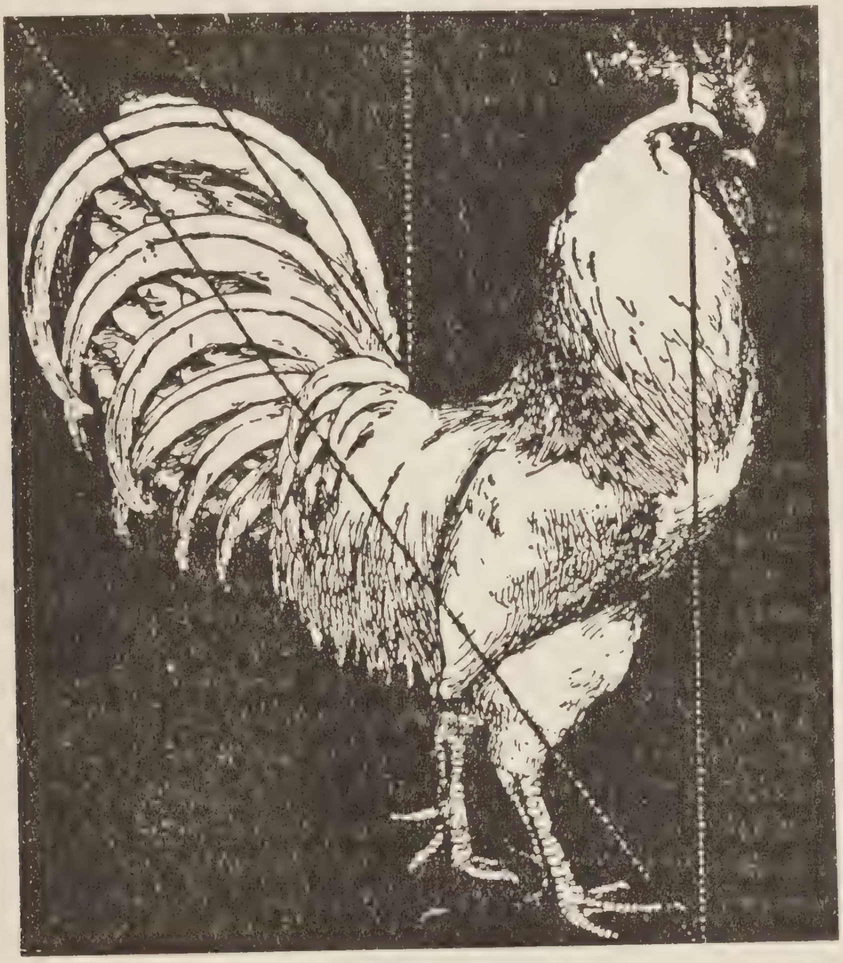
It is said that the Chinese make hens doubly useful as sitters. When the hen is not at work hatching out chickens, she is employed in hatching out fish. The fish spawn is collected from the river banks, and is placed in empty eggshells, which are afterwards hermetically sealed. The eggs so prepared are placed under a hen, and after she has sat on them for a few days the spawn warmed into life is emptied into a pond, when the little fish soon develop and are afterwards set free in the rivers.

FOWL MANURE.

A poultryman, who is noted for success in producing vegetables, states that he grows twice as much on an acre as formerly. He keeps 100 fowls, and has two lots of ground, one being given up to the fowls while the other is used for a garden, the lots being about 1¼ acres each. The next year he turns fowls on the garden plot, and uses for a garden the plot that was vacated by the fowls. By thus giving up his garden plot to poultry every alternate year, he keeps the soil very fertile.—*Texas Stockman and Farmer.*

THE WHITE LEGHORN.

A smart sprightly fowl is the White Leghorn, says the *Farmer and Stock-breeder.* Although regarded as an American production, this bird is of Mediterranean origin, as his name implies, and one has not to look far to observe the relationship he bears to the White Spanish. There are some differences between the two breeds, but they are trifling, and the most notable is, perhaps, that of the colour of the legs, the White Leghorn's shanks being yellow in colour. This bird's chief glory is his beautiful white plumage, bluish



in tinge rather than yellow, and in the farmyard he is a perfect picture. Although not quite so large as some of his kindred of the Leghorn breed, he is plump, and cuts up well on the table. The hens are industrious in their department, and lay good-sized white eggs. They thrive well in confinement, and are altogether a hardy and profitable breed.

The above illustration shows the proper angle at which the tail of the Leghorn rooster should be set.

A FEW THINGS YOU CAN'T DO.

You can't expect eggs from over-fat hens.

You can't make a profit from mongrel hens.

You can't expect chickens from eggs laid by unhealthy fowls.

You can't expect many eggs from an old or lazy hen.

You can't expect good health among your hens without grit and animal and green foods.

You can't expect your hens to give good profit unless you feed and care for them properly.

You can't expect fertile eggs from your hens if the rooster is a weak or unhealthy bird.

You can't expect to feed a hen properly for one year under 4s. 6d.

You can't expect every hen in the pen or flock to be champion layers.

You can't expect a proper profit from hens that are overcrowded in houses or runs.

The Orchard.

FRUIT CULTURE IN QUEENSLAND.

By ALBERT H. BENSON.

CITRUS CULTURE—Part V.

VARIETIES OF CITRUS FRUITS.

To attempt to describe all the varieties of citrus fruits met with in this colony would occupy more space than is available in this *Journal*, and would be outside the limits of the present article, as I am endeavouring to deal with fruit culture more from a practical than from a scientific standpoint.

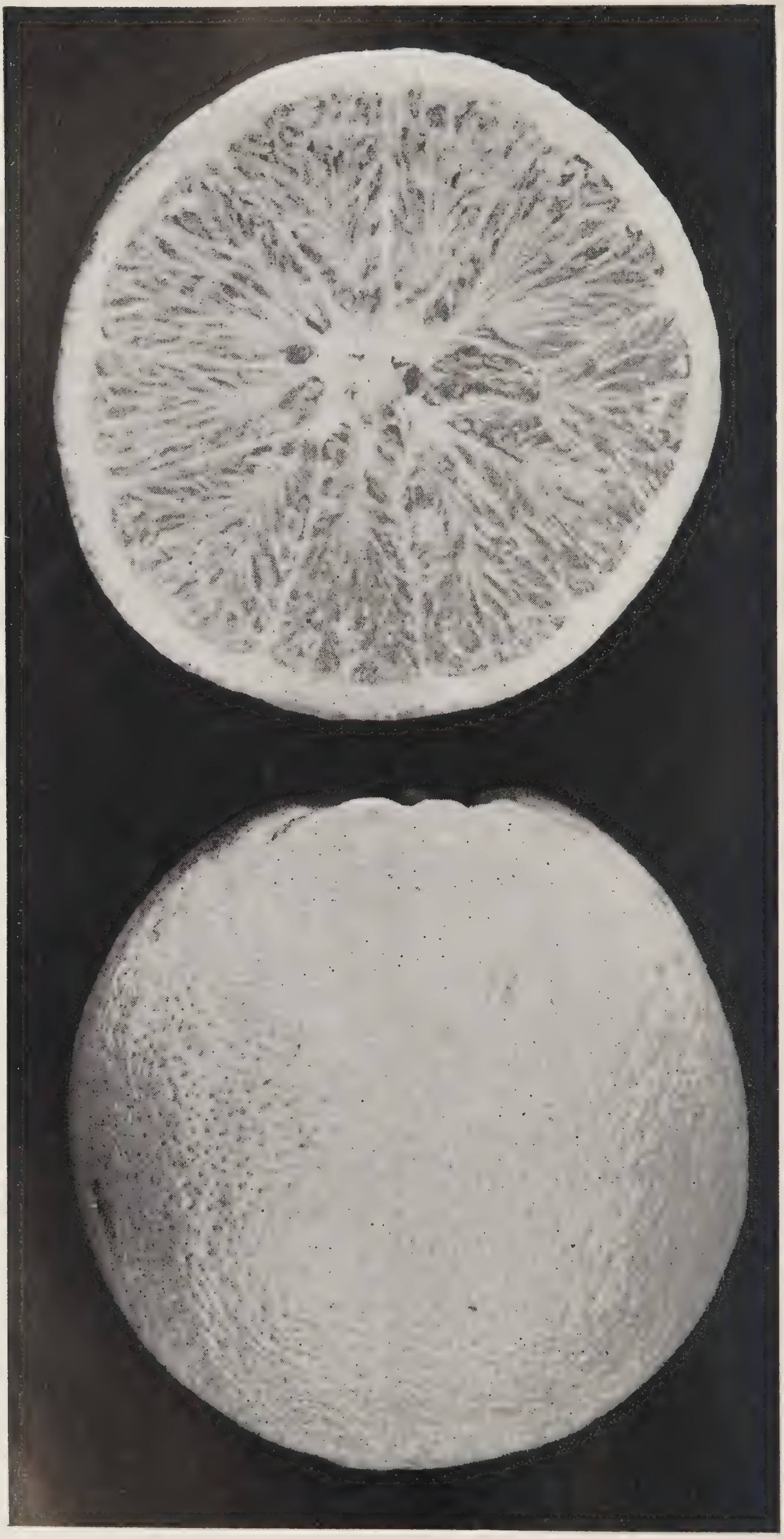
I will, therefore, confine my remarks to a short account of some varieties of approved merit now fruiting in this colony, as well as treat in a general way with seedlings. Until quite recently, the propagation of citrus fruits in this colony was carried out very largely by means of seedlings, usually in a very indiscriminate manner; but, some few years since, Mr. L. G. Corrie, of Brisbane, noting the inferior quality of a large proportion of the citrus fruits then grown, imported a large collection of the best varieties of citrus fruits grown in Florida, United States of America, and his importations have been followed up by others made both by this department and by nursery men.

Of these imported varieties of proved merit, several have turned out to be well adapted to our climate, and have produced fruit of high quality, while at the same time, as was to be expected, other varieties have shown no especial merit. Of the varieties that have been found to be well adapted for culture here, large numbers have been worked, many of which are now coming into bearing in various parts of the colony.

The advantages of growing trees of approved merit in the place of seedlings are shown in many ways, such as the early fruiting of the tree; its freedom from thorns; ease with which the tree can be pruned; the improved quality of the fruit, especially as regards a smaller proportion of rag and absence of seeds; the regular bearing of the trees; uniformity of shape and grade, &c.; whereas in the case of seedling trees, though they often produce fruit of high flavour and especial merit, they are usually very thorny; slow to come into bearing; irregular bearers, carrying a heavy crop one year and a small crop the next, and the fruit is usually very seedy and full of rag, as well as being uneven in grade and shape.

Seedling Oranges.—Of seedling oranges we have three general types: Oval, round, and flattened. The two former are probably derived from the round Portugal orange of the Parramatta type, whereas the latter are more of the St. Michael or Azorean type. Of these general types there are many variations, some very distinct, whilst others closely resemble the parent stock. The best types of seedlings are nearly round, of about 3 inches in diameter, having a thin but tough skin of a pale-yellow colour, and a soft juicy pulp of fine flavour, and possessing little rag, but usually plenty of seeds. The trees are vigorous, upright grown, and are very handsome and symmetrical when in bearing. They have a strong constitution, are dense growers, and very thorny, requiring severe pruning on the inside. The foliage is somewhat variable in the size and shape of the leaf, but of a dark, healthy, green colour. Fruit, such as described, is well worth propagating—either as a seedling, or better still by being worked on to a selected seedling so as to obtain a fixity of type—on account of its vigorous constitution and general excellence. Inferior seedlings, on the other hand, are not worth propagating, as they are of poor flavour, have a heavy skin, and are full of rag and seeds; in brief, they are not worth cultivating, as they cannot compete in the open market against better varieties.

Plate XLIX



WASHINGTON NAVEL.

Plate L

GROVELEY NAVEL.

Worked Oranges.—In many instances, worked oranges have got a bad name in Queensland, and this is due almost entirely to two causes, the first of which is that the bulk of worked trees planted in the past have been imported from New South Wales, where they have been worked on the common lemon stock. This stock, as I have stated in an earlier part of this article, is quite unsuited to this colony. The second reason is that many of the imported worked trees have been propagated from so-called varieties that are very inferior to a first-class seedling. So that, when they have come into bearing, their fruit has been found to be inferior, both in size and quality, to that of many locally-raised seedlings. This strong feeling against worked oranges is now dying out, and many trees of varieties of proved merit are now being propagated yearly by Queensland nurserymen on stocks suitable to our climate. Those are found to do well, and produce good crops of high-class fruit.

Washington Navel.—Probably no orange has come into such a prominent position or obtained such a hold of the world's markets during the past twenty years as the Washington Navel. This variety is a native of Bahia, in Brazil, the particular type called "Washington" having been obtained thence by the United States Department of Agriculture in 1870, and distributed by them. This orange is more generally cultivated in California than any other variety, and from there has been widely distributed throughout Australia.

The tree is a strong and vigorous grower, with large dark-coloured leaves and a few small thorns, but it does not grow as upright or to as large a size as a seedling. When grown in suitable soil—viz., a rich, well-drained loam—it is an early and prolific bearer, but it does not thrive on poor, sour, or badly drained land, in unsheltered positions, or on land subject to heavy frost. The fruit is of large size, in young trees often over-large, having a fine, thin, smooth skin, which thickens considerably towards the stem end, and is of a pale-orange colour. The pulp is juicy, sweet, of fine flavour, contains very little rag, and is usually seedless. It has good keeping qualities, hence is a good shipper, and valuable for export.

The illustrations of this fruit (Plate XLIX.) are typical of this variety as regards its shape and size, but do not show its quality to advantage, as the specimen from which the photographs were made was taken from a young tree growing on very rich volcanic scrub land belonging to Mr. H. Smith, of Montville, so that the skin is somewhat coarse, and there is a large centre to the fruit. These faults, which are common to the first crops from young tree, will, however, disappear as the trees get older.

Common Navel.—This is the ordinary Navel orange of Australia, and is very similar in every way to the Washington, with the exception that the tree is usually a stronger grower, that blooms profusely, but seldom sets a good crop. The fruit also is uneven in size, though of fine quality. It is undoubtedly derived from the same source as the Washington Navel—viz., from the Bahia orange; the only difference that I can see being that the Americans were lucky enough to obtain their original stock from a rather more dwarf and more prolific strain than the first trees that were imported into Australia from Bahia were originated from. Of the common Navel type we have, however, produced a prolific tree in the Grovely Navel, so called from the original tree having been grown near Grovely Church, Enoggera. The original tree was noted for the excellence of its fruit, and for its prolificness. Fortunately, a tree worked from the original is now in the possession of Mr. W. H. Parker, of Glen Retreat, and is producing fruit of excellent quality as well as turning out a constant bearer. Plate L. gives a very fair illustration of this type of Navel, which, in my opinion, is well worth propagating.

Maltese Blood.—Though of small size, this is one of the finest quality of oranges grown, and is maintaining its high standard when grown in this colony.

The tree is thornless, of a compact and somewhat dwarf habit of growth, so that it does not need to be planted as far apart as seedlings or stronger growing varieties. It is a good and early bearer, and is conspicuous for its dark

glossy foliage and sturdy habit of growth. The fruit is of small size and oval shape, having a smooth thin skin, even in young trees, of a pale-yellow colour at first, becoming darker and blotched with brownish-red as the fruit becomes fully ripe, especially when the trees attain some age. The pulp is very juicy, contains few seeds, is of high flavour, and, when fully ripe, is mottled with red; though in young trees the colouring is not so distinct as in the case of older trees in full bearing. Though small, it is a good keeper, and carries well; so that, on account of its high quality, it will be a valuable variety for exporting, as, when once well known, it will always command a ready sale in any market to which it may be sent.

The illustrations of this fruit (Plate LI.) are typical of the variety, and were made from fruit grown on a young tree, first time bearing, belonging to Mr. W. H. Parker.

Valencia Late.—A very good quality late orange of medium to large size. Tree a strong grower, few thorns, with a dark foliage. Leaves somewhat smaller, narrower, and more pointed than any of the previous varieties. The tree does not, as a rule, come into bearing as early as other worked kinds, though I have seen instances of quite small trees in this colony literally breaking down with fruit.

The fruit is roundish or roundish oval in shape, sometimes tapering at the stem. Skin smooth and fine; pulp of good quality; acid till fully ripe; few seeds and moderate rag. It will hang on the trees here till after Christmas, and could it be protected from the ravages of the fruit fly during spring and early summer it would be a valuable variety to grow on this account. The variety is very highly spoken of in California and Florida, from both of which States it has been introduced into Queensland.

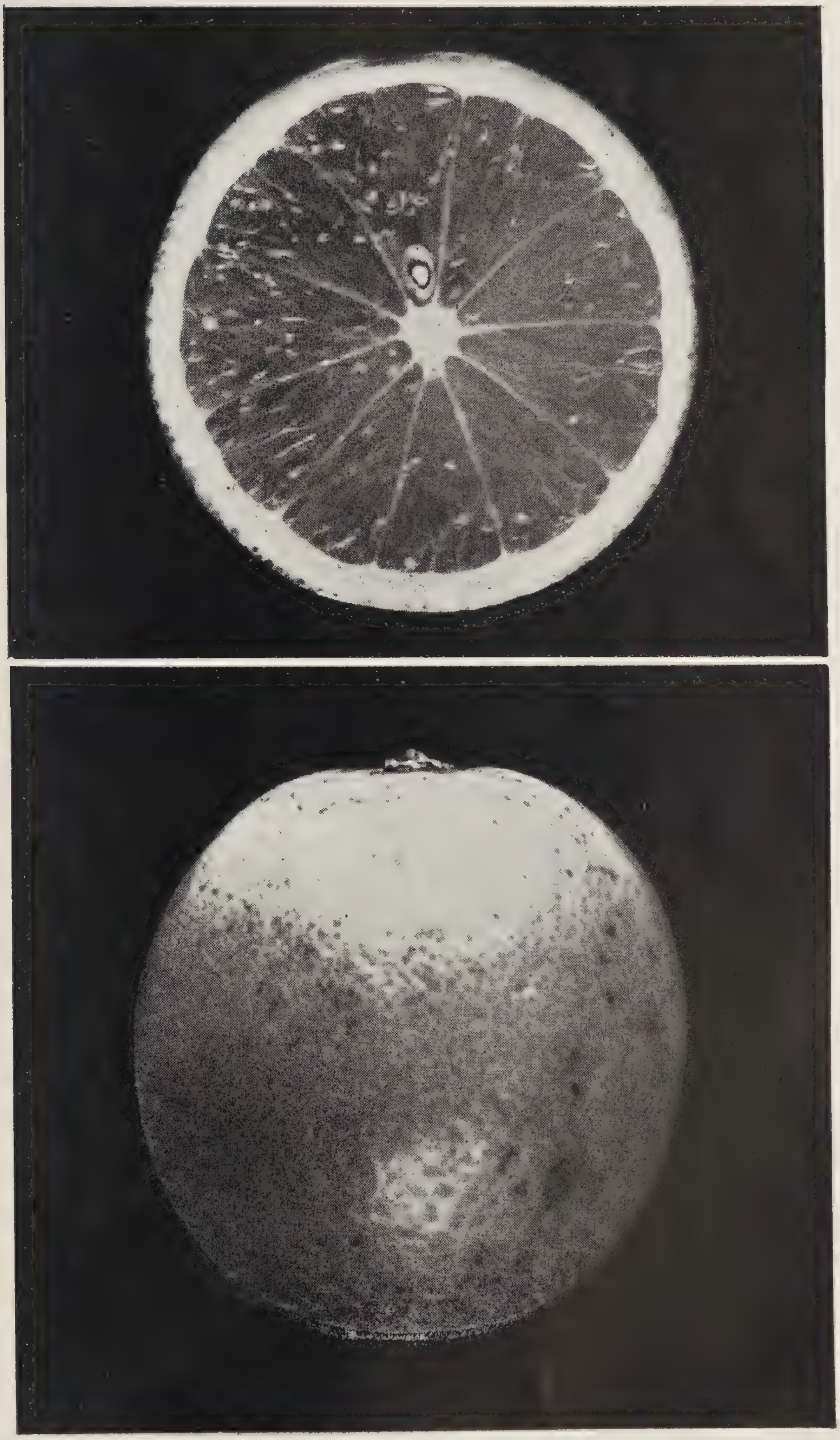
Sabina.—A round orange of good quality—origin unknown, but it has been grown in New South Wales for many years, though it has latterly gone somewhat out of cultivation. The tree is a strong grower and prolific bearer even when young—nearly thornless. Fruit of good size and fair quality, though somewhat raggy and seedy; but this is probably due to the tree's age and the richness of the soil on which the samples I have tested have been grown. Both this and the preceding variety are illustrated on Plate LII., the upper fruit being Valencia Late and the lower Sabina. As will be noted from the illustration, the skin of both is somewhat coarse, but, as the trees from which the samples are taken are only four years old from the bud, extreme quality could not be expected. These fruit were grown by Mr. H. Smith, of Montville.

Mediterranean Sweet.—A first-class fruit that is largely grown in California, but was not originated there; the first trees being imported into California from Southern Europe. The tree is a somewhat straggling grower of a not very vigorous habit; thornless, and is prone to overbear. Its habit of bearing in bunches is shown by the illustration of this variety on Plate LIII., which was also taken from a tree of Mr. H. Smith's. The fruit is of a good size, round, inclined to oval with a thin smooth skin; pulp sweet, juicy, medium rag, few seeds. A good marketing and shipping variety. Like the Maltese Blood, it can be planted nearer together than the stronger growing sorts.

Foster.—A round orange, of Florida origin. Tree a very vigorous grower, moderately thorny, but not as bad as a seedling, and a good bearer. Fruit of excellent quality, thin skin, fine flavour, with little rag, but somewhat seedy. The original trees of this variety were introduced by Mr. L. G. Corrie, and have borne fruit of very high quality, so that it is a promising variety for cultivation.

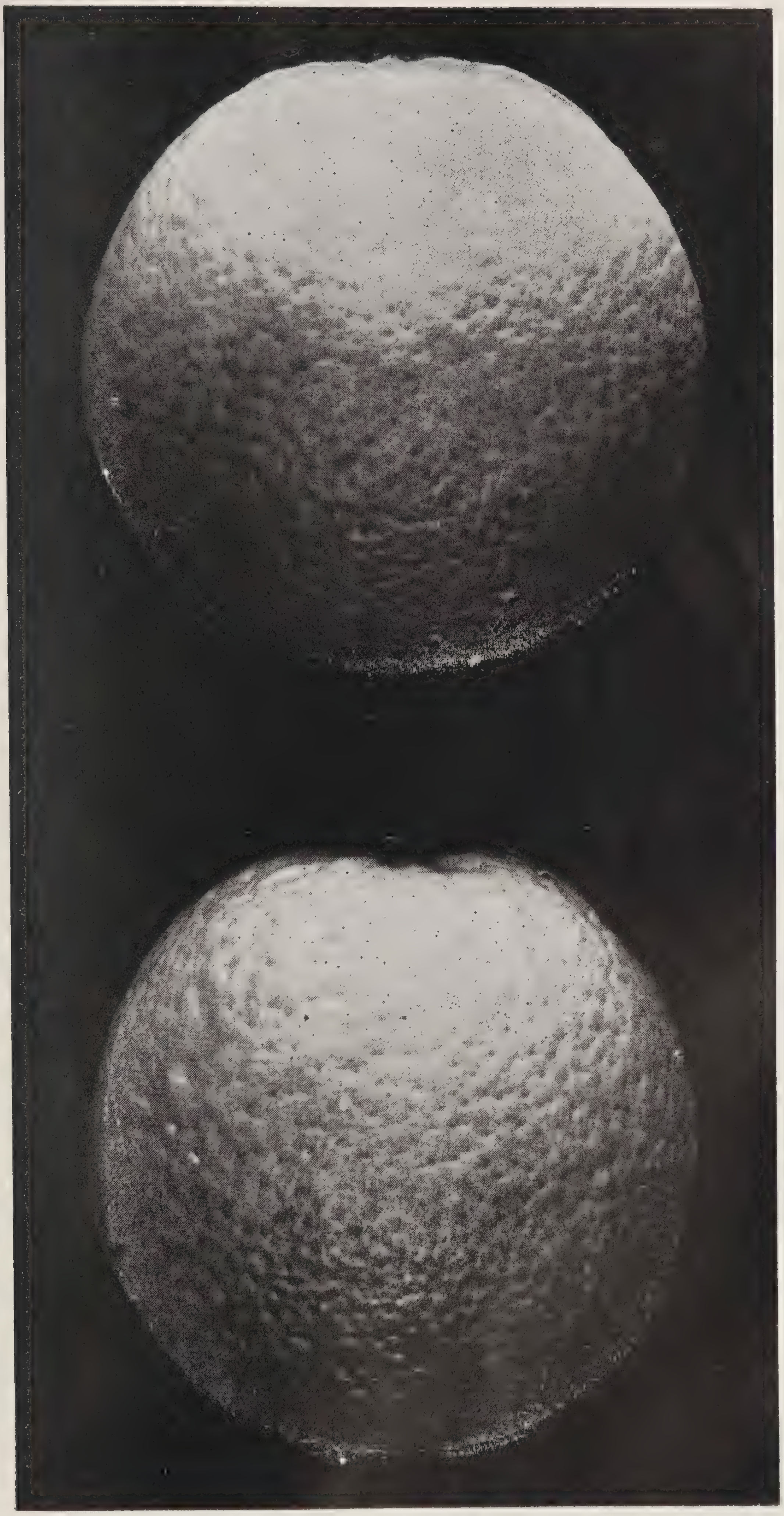
Paper Rind St. Michael.—A small rounded oval fruit of the first quality, that has not fruited as yet in this colony, to my knowledge. Is highly thought of in California, and has produced very high-class fruit in Mildura, Victoria. Tree of dwarfish habit, thorny, and good bearer; said to hang well on the trees and ripen late.

Plate LI



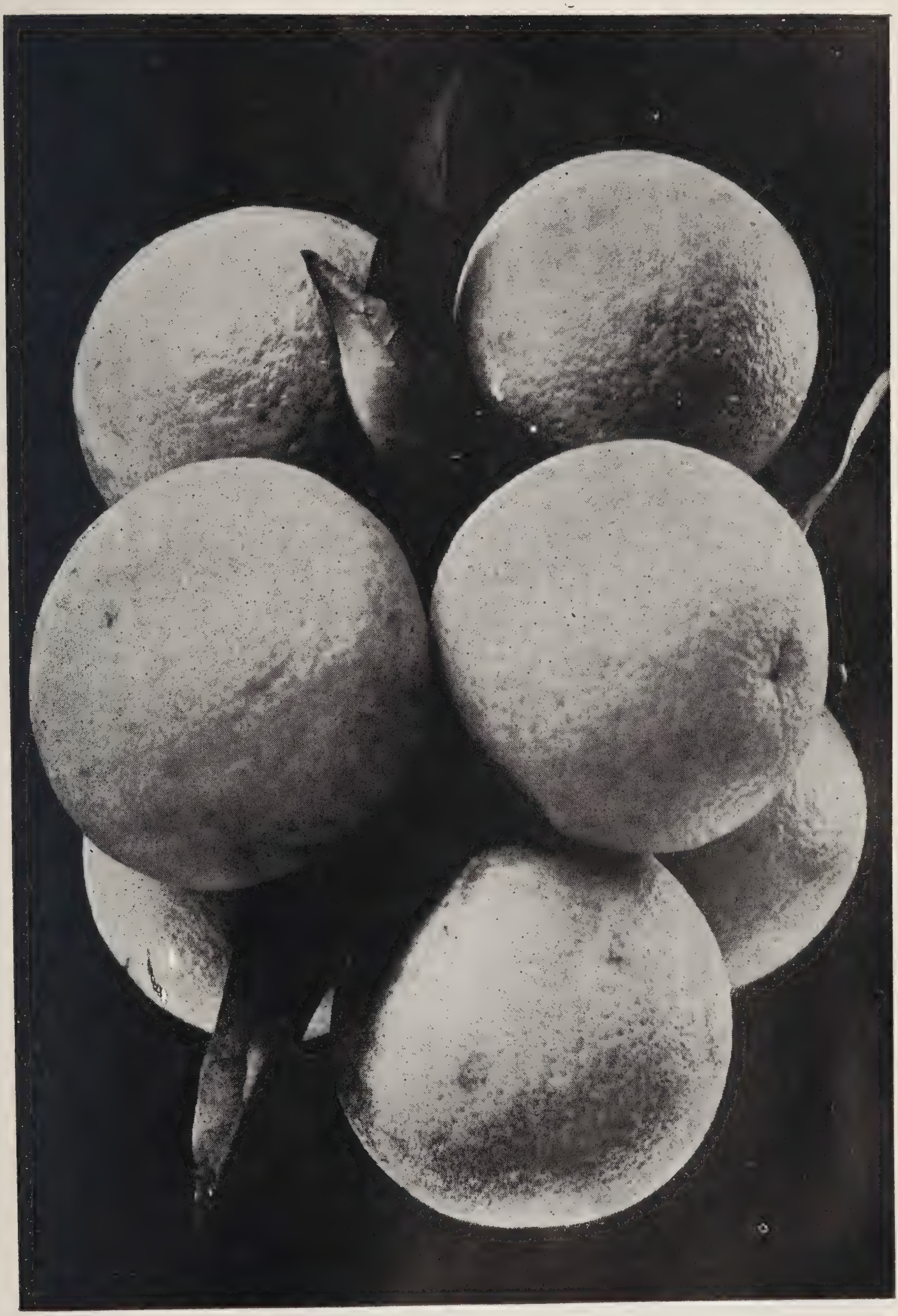
MALTESE BLOOD.

Plate LII



1. SABINA 2. VALENTIA LATE.

Plate LIII



MEDITERRANEAN SWEET.

Jaffa.—A large oval orange of the first quality, that fetches top prices in the London market. Trees of the variety were imported by this Department some years ago, and are now fruiting in the orchard of Mr. Philp, at Mount Whitestone, Gatton, and are coming true to type, though somewhat coarse. The tree is a strong grower with very large leaves on the strong young shoots; thornless, and promises to do well in the colony. The fruit is of large size, long oval in shape, with coarse skin round the stem. Skin only moderately fine, very coarse in the case of fruit from young trees, pulp rich and juicy, little rag, and nearly seedless. Should this orange improve in quality as it grows older, as is to be expected, it will be a valuable variety for exporting.

Seville.—The orange from which the marmalade of commerce is made. Like the sweet orange, the Seville has been largely grown from seed in this colony, with the result that it is a difficult matter to obtain it of the true type. In order to obtain this fruit true to type, a quantity of Seville fruit has been obtained from Southern Europe, the seeds of which have been planted in this colony, and from those seedlings it is hoped that we will raise a quantity of fruit of the true type. The true Seville has a fruit of average size, about 3 inches in diameter, which is flattened at both ends. The skin is rough, fairly thick, and of dark-orange colour, having a strong bitter taste, but not acrid. The pulp is juicy, and strongly acid, not bitter or bitter sweet as is usually the case in our locally grown fruit. The rag and pith on the inside of the skin are both bitter. The skin should part readily from the fruit, and when cooked should be transparent, with the exception of the rind. The pulp of the fruit should also form a firm jelly when boiled with sugar.

The tree is a vigorous upright grower, very thorny, with distinct, bright-green foliage; the leaves are long and pointed, with well-developed wings on each side of the base, forming a sort of double leaf. The Seville does very well in Queensland, and it can be grown on heavier land than that most suitable to sweet oranges. Its cultivation is being considerably extended, and it will shortly become an important adjunct to the citrus industry of the colony.

Mandarins.—This class of citrus fruit does remarkably well in this colony, both seedlings and worked trees producing fruit of large size and especial merit. There are a very large number of seedlings differing somewhat from each other, but they may be classed under the following heads:—The Scarlet type; the Canton or Emperor type; the Thorny or Tangerine type; and the Beauty of Glen Retreat type. Worked trees have the advantage over seedlings in that they have usually fewer thorns and seeds, and also that only the very best types are propagated; whereas in the case of seedlings there is always more or less uncertainty in obtaining a definite type possessing superior qualities.

The Beauty oe Glen Retreat.—The origin of this, the king of mandarins, is uncertain; but as far as Queensland is concerned the original tree, from which the many thousand trees now planted have been derived, is still growing in the orchard of Mr. W. H. Parker, of Glen Retreat, Enoggera, from which it has taken its name. The original tree is now between thirty and forty years of age, and when at its best must have measured at least 24 feet in diameter by 20 to 22 feet in height, so that it will be seen that it is by no means a dwarf variety.

The tree is a vigorous grower, inclined to become very dense unless kept well pruned out—thornless when worked, though seedlings have often numerous thorns. It is of a somewhat spreading habit of growth; has a distinct foliage, that in the young growth being easily distinguished from any other variety; and is a very early and prolific bearer. In fact, its fault is to over-bear.

The fruit is of large size, up to 3½ inches in diameter; very heavy, of a dark-orange, sometimes reddish-orange colour when fully ripe; skin very smooth and thin, tightly attached to the pulp, with practically no pith, and often shining as though polished with an oily cloth.

The pulp is firm, juicy, sweet, highly flavoured, solid right through, and with few seeds.

Although the skin is so thin, yet when the fruit is sweated it becomes toughened, and this, together with the firmness of the fruit, renders it a good carrying variety when properly handled and carefully packed. The illustrations of this variety (see Plate LVI.) are from samples grown by Mr. Parker, taken from trees worked direct from the original tree, and show the true type of this fruit.

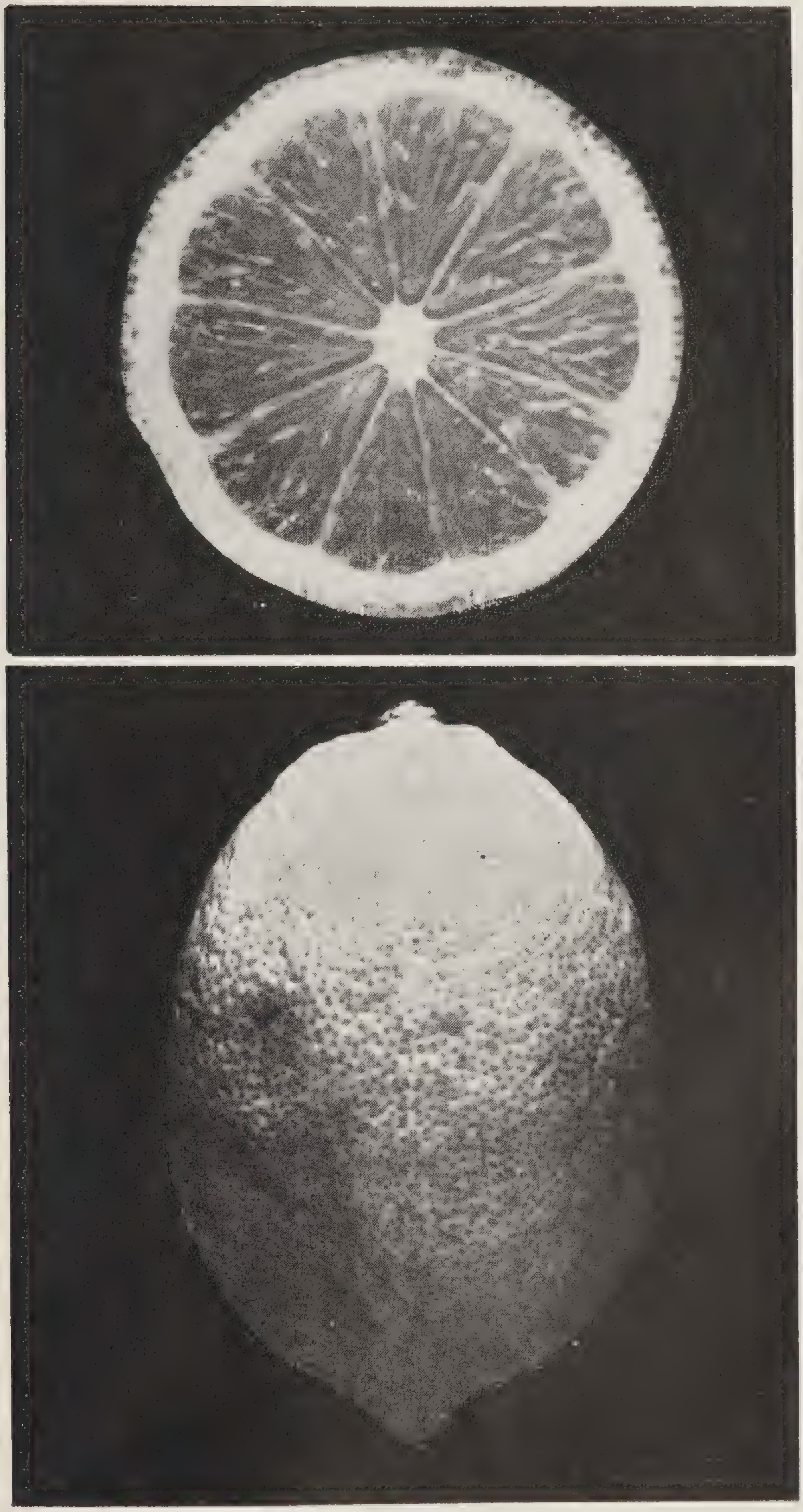
THE SCARLET MANDARIN.—Mandarins of this type are widely distributed throughout the citrus-growing districts of this colony, and are usually most profitable to grow, as on account of their large size, fine colour, and good flavour they meet with a ready sale. This fruit is evidently of Chinese origin, and was amongst the earliest varieties of citrus fruit introduced in the colony, as there are several trees still in full bearing that must be close on forty years of age. There is a general similarity in the type of all Scarlets, though there is a great difference in quality, as, as I have previously stated, is always the case where the variety is propagated largely by means of seedlings. The tree is a vigorous but somewhat spreading grower, inclined like the Beauty of Glen Retreat to grow too dense, has few thorns, in the case of worked trees often none; is a heavy bearer, individual trees having produced as much as 15 cwt. of fruit in a single season. When well grown the fruit is of large size, 4 inches and even more in diameter, very flattened both at the apex and stem, the latter being often surrounded with an irregular-shaped protuberance. When commencing to colour, the fruit is firm and the skin moderately tight, but as the fruit reaches maturity the skin becomes of a rich reddish-orange colour, and is more or less detached from the pulp. Between the skin and the pulp there is a distinct fibrous network, but little, if any, of the pith that is met with in oranges. The pulp is of a dark-orange colour, juicy, sweet, of fine flavour, and usually contains a considerable number of seeds. As the fruit becomes fully ripe, it becomes more or less puffy, as not only is there a considerable space between the skin and the pulp, but there is also a large hollow in the centre of the fruit itself. On account of its more or less puffy nature, it is not a good fruit to export, especially if packed without first being thoroughly sweated, as the skin is then very soft, brittle, and easily injured. Its keeping and carrying qualities, are, however, greatly improved by careful handling and sweating. It should never be pulled from the tree, but always be cut. This applies to all kinds of mandarins.

The bunch of Scarlet Mandarins shown in Plate LV. are half natural size. The illustration, which is taken from a photograph of a cluster of fruit grown by Mr. S. C. Voller, of Enoggera, gives a very good idea of the correct type of this fruit, and of the way it sets its fruit when the trees are well manured and well cared for.

THE CANTON OR EMPEROR MANDARIN.—Like the Scarlet, there are many types of this fruit, some being very superior in quality to others. The tree is a strong, upright grower, very distinct from any other mandarin. Seedlings more or less thorny, but few thorns on worked trees. It is not as dense as either of the preceding varieties, and when in full bearing it is a very handsome and symmetrical tree. It is a heavy bearer; a single tree belonging to Mr. W. W. Burnett, of Buderim Mountain, having produced over thirty-seven cases in a season, or a total of over 18 cwt. The fruit is of medium to large size, roundish, irregular, and flattened at the ends; skin of a yellow colour, brittle, moderately thick, parting readily from the fruit, and becoming somewhat puffy when the fruit is fully ripe. There is a great difference in both the puffiness of the skin and the firmness of the pulp in different types of this fruit, and where trees are to be worked it is advisable to select scions from trees that produce large, solid fruit with tight skins, provided, of course, that they possess the requisite quality. It is not as profitable a type to grow as the Scarlet, for, though it is usually superior to it in flavour, it has not the attractive appearance of that variety.

THE THORNY MANDARIN OR TANGERINE.—This type of mandarin when well grown possesses the most distinct flavour of any citrus fruit, and is considered by many judges to take the first place for quality amongst Mandarins. Like the other types of mandarins, there is a considerable difference in the size and quality

Plate LIV

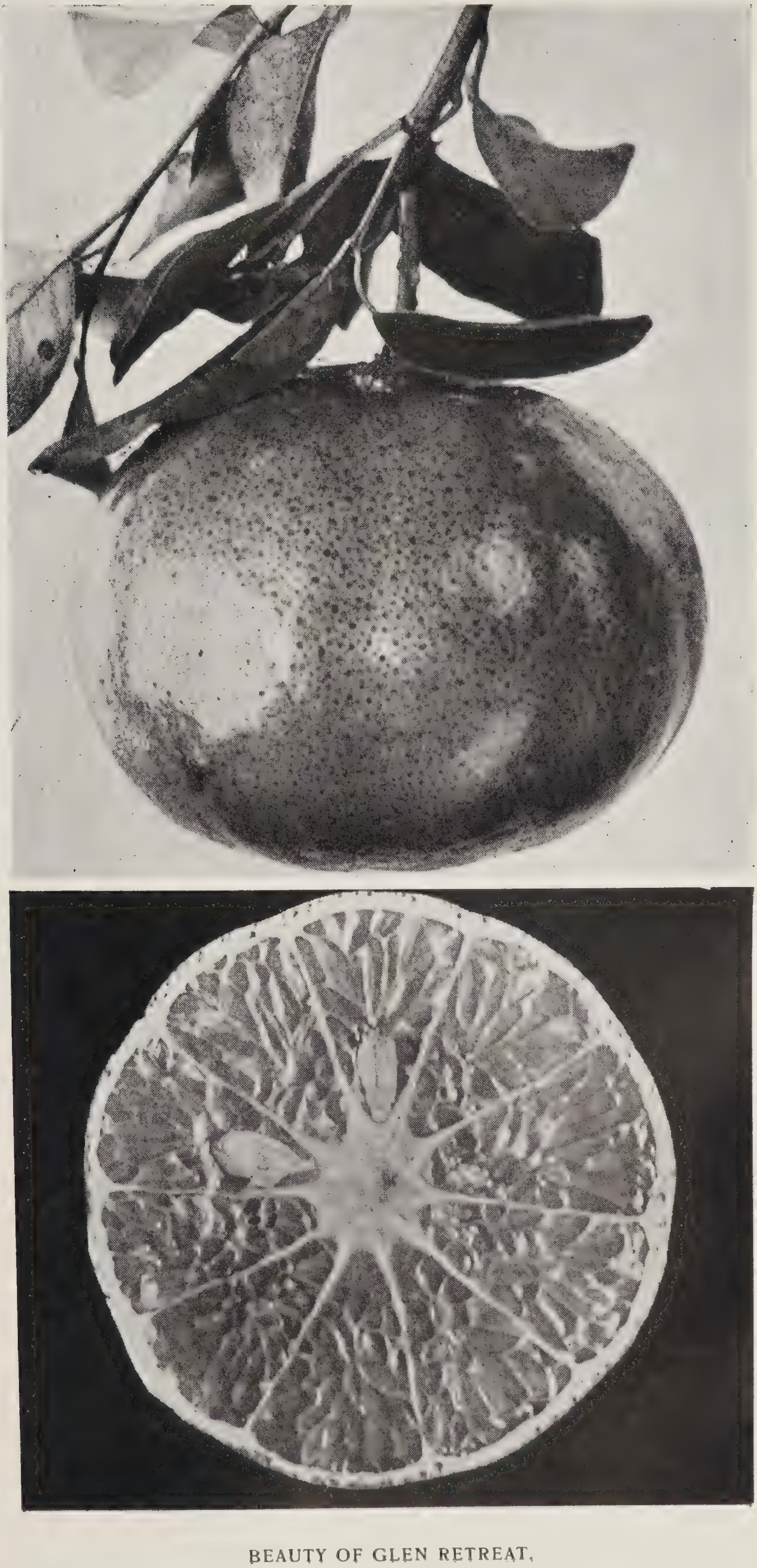


VILLA FRANCA LEMON.

Plate LV

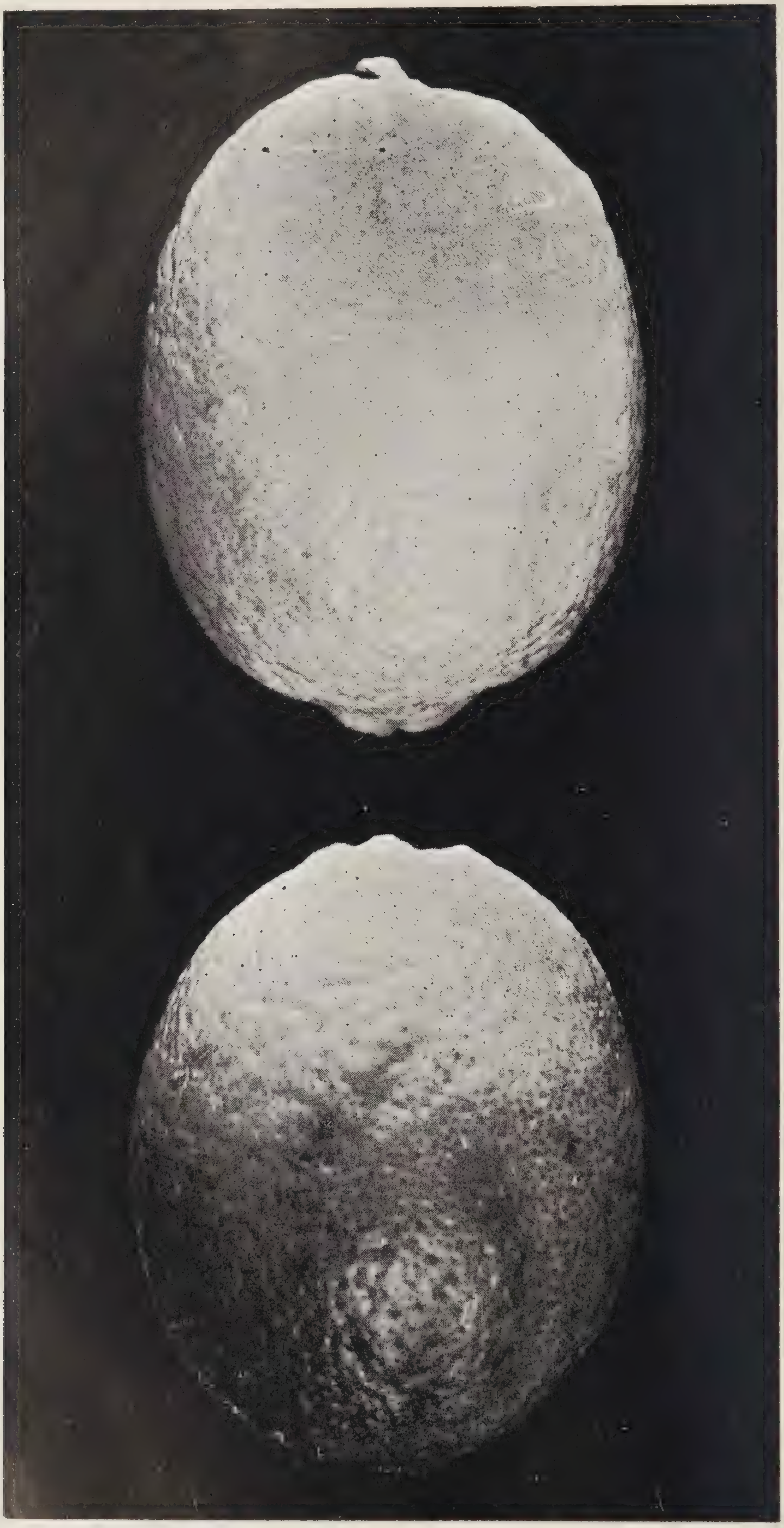
SCARLET MANDARINS.

Plate LVI



BEAUTY OF GLEN RETREAT.

Plate LVII



1. LISBON LEMON.

2. SICILIAN LEMON.

of the fruit from different trees, but the scented skin and pulp is characteristic of the whole of the type, though much more pronounced in some specimens than in others The tree is more of the habit of a bush than a tree; is a dense grower, of spreading habit; a heavy bearer, very thorny, and requiring severe pruning to produce large fruit; often very subject to disease, and only thriving in certain soils. The fruit is of small to medium size, roundish, but flattened at the ends; stem fine and very firmly attached to the fruit; skin thin, of a pale-yellow colour, tight on the fruit, from which, however, it is easily removed. Pulp juicy, sweet, and very aromatic, usually very full of seeds. The fruit is at its best before it become fully ripe, as in the latter case it is often dry and puffy. One or two types of this variety are worth propagating on account of their quality and their freedom from thorns, but, as a rule, it is by no maens as profitable a variety of mandarin to grow as any of the others that I have described.

Lemons.—Many different kinds of lemons have been tested in this colony, but, so far, none have turned out to be a great success in any of the coastal districts, though most have done well further inland. The tree thrives all right; produces an abundance of fruit; but the fruit is coarse and of poor quality.

Villa Franca.—A seedless lemon, having an aromatic sweet rind and an acid juice. The tree is a moderately vigorous grower, free from thorns, stands a fair amount of cold without injury, and bears its fruit throughout the year. It does fairly well near the coast when grown at and above an elevation of 1,000 feet, and given proper care and attention should prove to be the most profitable variety to grow near the coast.

The illustration of this fruit (Plate LIV.) is taken from a freshly cut fruit grown by Mr. H. Smith, Montville. It shows the type of the fruit, and the absence of seeds. The skin, if cured, would thin down to fully one-half the thickness shown.

Lisbon.—The most widely grown variety of lemon in Australia. Tree a vigorous grower, very thorny, a heavy bearer. Fruit of medium to large size, having a good skin, pulp containing a sharply acid juice and several seeds. The fruit should never be allowed to ripen on the tree, as, if so, it becomes very coarse in the skin and loses the quality of its juice. The fruit should be cut when about 2½ inches in diameter, cured, and stored till the market is ready. All lemons should be treated in this manner. There is a variety of Lisbon lemon having variegated foliage, and of which the unripe fruit is also variegated, that does well in coastal Queensland, and produces good quality fruit. It is a much less vigorous grower than the common Lisbon.

Sicilian.—A very similar lemon to the Lisbon, but the tree is practically thornless, and the fruit is rather rounder and more pointed at the apex. The illustrations on Plate LVII. show typical specimens of a Lisbon lemon and of a Sicilian lemon—the former on the top of the plate, and the latter on the bottom. Both were grown by Mr. W. H. Parker.

Limes.—This fruit thrives remarkably well in coastal Queensland from the New South Wales border to Cooktown, and is preferable in such districts to the lemon.

Tahiti Lime.—This really fine fruit was introduced by Mr. L. G. Corrie from Florida, and though it has been well advertised it has not taken the hold on the colony that its quality warrants. In my opinion we cannot grow a lemon in the coastal districts that has the slightest chance of competing against it. The tree is of a somewhat dwarfish and spreading habit of growth, the branches having a tendency to form narrow forks, the lower of which break off when the tree is laden with fruit. This necessitates special pruning to prevent such forks, and if this is carried out there is no difficulty in keeping the tree in good shape The foliage is of a dark-green colour, and there are only a few small thorns. Tree a heavy bearer, flowers and fruit in all stages of development being on the tree at the same time. The fruit is of large size for a lime, up to 2¼ inches or more in diameter; skin very thin, of a pale-yelow colour; pulp pale-green, firm, very juicy, and seedless; juice briskly acid, and

makes the best squash obtainable. The illustrations of the fruit on Plate LVIII., which are taken from fruit grown by Mr. W. H. Parker, give a very good idea of its general appearance and quality.

West Indian Lime.—The fruit from which the limejuice of commerce is obtained. It does very well in coastal Queensland, and in the scrubs to the south of Cairns many trees are met with, growing practically wild on the sites of abandoned selections, that in the season are laden with excellent fruit. The tree is a fairly strong grower, thorny, and a heavy bearer. Fruit small, nearly round, of a pale-yellow colour; pulp greenish, full of juice, and with plenty of seeds. Juice strongly acid, and makes an excellent squash.

Citrons.—Although there is at present a very small demand for citrons in Queensland, this fruit can be grown with the greatest ease and in any quantity. Several varieties have been introduced into the colony, but the common long-shaped or Knight's Citron and the large round or Bengal Citron are about the best for the manufacture of peel. The latter is a vigorous grower and heavy bearer, the fruit often weighing over 3 lb.

Cumquats.—There are two varieties commonly grown, a round and an oval; both are used for preserving and jam-making, but are not of any great value commercially.

Pomelos.—Of little value in this colony, as there is no demand for the fruit. All varieties, however, do well.

Poor Man's Orange.—This orange and several varieties of acid and semi-bitter citrus fruits are grown to a small extent in several parts of the colony. They are usually hardy trees, and good bearers, but, beyond a small demand for the fruit for preserving purposes, there is no outlet for any large quantity. These types of citrus fruits and the preceding four classes have little commercial value in this colony at present, though, should a demand be created, they can all be grown of the best quality, and with comparative ease.

LATE-FRUITING CITRUS TREES.

In a report of the Cairns annual show, given in the *Morning Post*, it is stated to be "a puzzle to all of us (Cairns orchardists) to know how Port Douglas manages to produce first-class oranges, lemons, mandarins, &c., weeks after our supplies are finished."

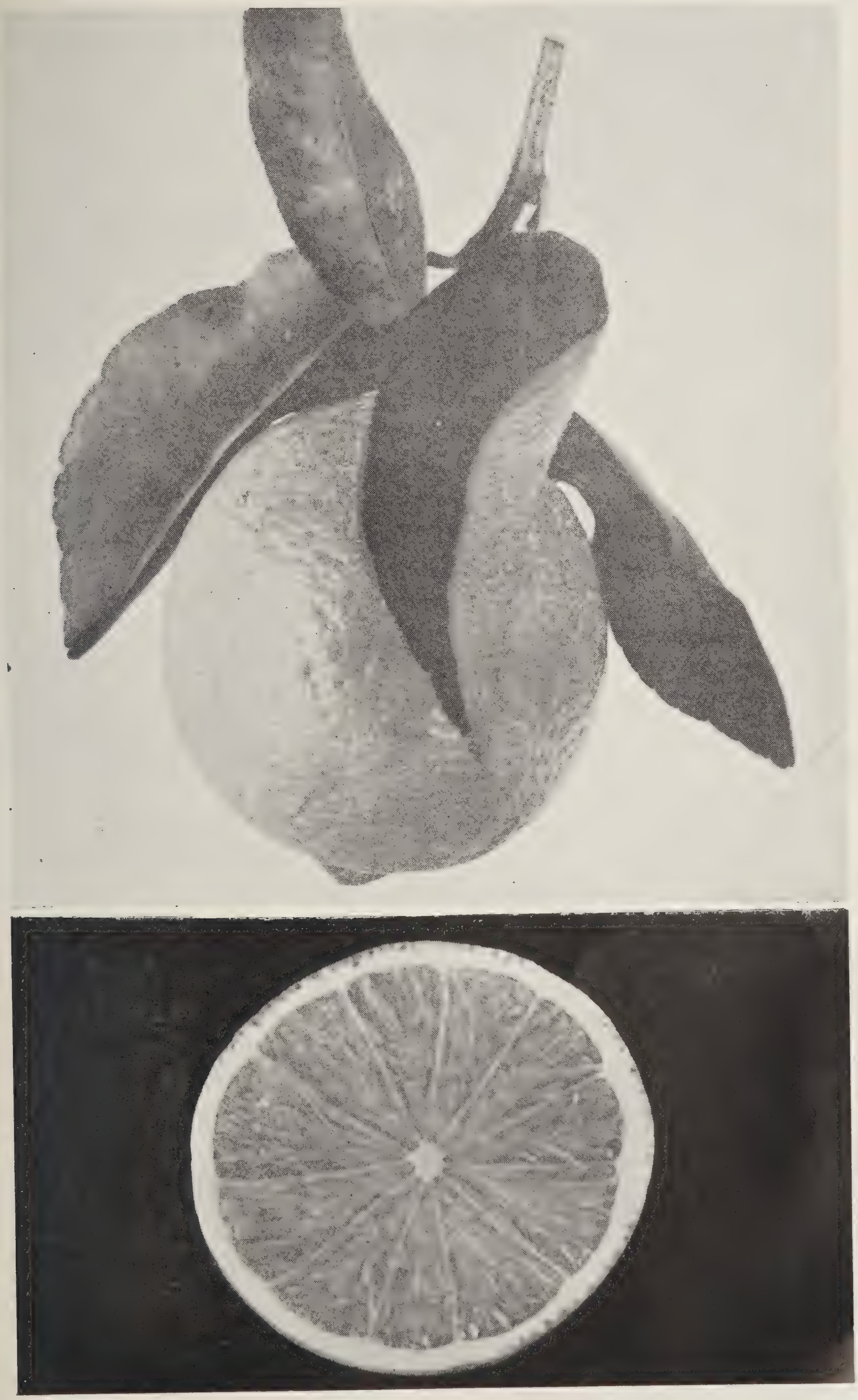
We (*Queensland Agricultural Journal*) should be glad to know if this is a general thing, or whether it has only occurred this season. Meanwhile, Mr. A. H. Benson gives the following as the probable solution:—

Three years ago I saw the same thing at Cooktown, the citrus fruits being then at their best in September. This was due to unusual climatic conditions. There was no main crop of fruit, and in consequence the trees came into full blossom in early autumn, ripening their fruit as stated. The quality of the soil has also a marked effect on the holding qualities of the fruit—that is to say, whereas the trees growing on one soil will not hold their fruit after the sap begins to rise in spring or late winter, on another soil in the same district the fruit will hang much longer. Probably one of the above reasons accounts for the fact that the season of the Port Douglas citrus fruits is later or lasts longer than that of Cairns.

STRAWBERRIES.

Mr. J. Pink brought to our office a collection of five varieties of strawberries, named, respectively, Federation, Royal Sovereign, Marguerite, Trollope's Victoria, and Pink's Prolific. All were in perfect condition, and were submitted to experts and others for judgment of their respective merits. They were examined and tasted by ten gentlemen, whose unanimous verdict was that Pink's Prolific, although much smaller than the other kinds, was the best both in flavour and internal colour. The Royal Sovereign and Trollope's Victoria came second and third in point of merit, whilst Marguerite and Federation found little favour, especially the latter, which was pronounced tasteless, and of little value to the jam factory

Plate LVIII



TAHITI LIME.

Viticulture.

VINE-GROWING IN SOUTH AFRICA.

Dr. Moszeik, of East London, says Mr. Krichauff, reports that up to 1891 no less than 78,500,000 vines had been planted there, producing 5,000,000 gallons of white and 1,000,000 gallons of red wine; also 1,500,000 gallons of brandy and 1,500,000 lb. raisins. Since then the phylloxera reduced the produce. Even in 1891, 8,000,000 vines had already been destroyed. The Government has, however, acted wisely in at once procuring cuttings of American resisting vines. These were sold cheaply, and prizes were given for successful plantations. Most of the wine is still made in a very primitive fashion, but to show the great productivity of the soil he gives the production of wine elsewhere as mentioned by Von Baba. For Germany, Hungary, and Algiers an average of about 24 hectolitres (1 hectolitre, 22 gallons) is produced per hectare (2½ acres, 211 gallons per acre); in Spain, Greece, and France, 17 to 18 hl.; in Switzerland, 42 hl.; nearer the coast in South Africa, 86 hl. (516 gallons per acre); and in the interior up to 173 hl. Dr. Moszeik states that at Worisster, Montagu, and Ladysmith as much as 287 hl. per hectare have been pressed. This wonld be about 2,500 gallons per acre.—*Garden and Field.*

As a comparison with the foregoing, the area under grape vines in bearing in Queensland during 1899 was 1,746 acres, yielding 3,230,627 lb. of grapes, an average of 1,850 lb. per acre, as against 4,116,218 lb. in 1898 and an average of 2,383 lb. per acre. The quantity of wine made in the former year was 134,334 gallons, and in 1899 131,045 gallons. About one-half of the grapes produced are made into wine; consequently it may be assumed that some 800 acres yielded an average of 163 gallons per acre, besides 615 gallons of brandy. It must be remembered, however, that, owing to the severe season of 1899, the yield of grapes per acre in some districts, especially Roma, fell from 3,306 lb. in 1896 to 327 lb.

USEFUL RULES.

The theoretical velocity with which water flows under a given head is 8·03 times the square root of the head. To find the pressure in pounds per square inch of a column of water, multiply the height of the column in feet by ·434, approximately; consider that every foot elevation is equal to ½-lb. pressure per square inch; this allows for ordinary friction. To find diameter of pump cylinder to move a given quantity of water per minute (100 feet of piston being the standard of speed), divide number of gallons by 4; square root of quotient will be diameter (in inches) of the pump cylinder. To find quantity of water elevated in one minute, running at 100 feet of piston speed per minute, square diameter of the water cylinder in inches and multiply by 4. To find the theoretical horse power necessary to elevate water to a given height, multiply total weight of the water in pounds by the height in feet; divide the product by 33,000; (an allowance of 25 per cent. should be added for water friction, and a further allowance of 25 per cent. for loss in steam cylinder).—*Pacfic Rural Press.*

Apiculture.

APPLIANCES FOR RAISING COMB HONEY.

By H. R. STEPHENS,
Busy Bee Apiary, Toowoomba.

My paper this time will deal chiefly with the various means and appliances for raising honey in section boxes or, as is the usual term, "comb honey." Among the older and, to some extent, superseded devices is the "wide frame," which holds eight 1-lb. section boxes, and is hung in the hive in a similar manner to the ordinary frames for extracting, but only seven to a set in place of the usual ten. Another arrangement is the T super, which permits of the whole of the sections being removed at once, and, as there are no frames required, more can be put in the super at one time. This method labours under the disadvantage that, when once packed, the side sections are troublesome to move to the centre, as bees preferably fill the latter first, and then, if not moved, the combs are filled unequally, the side being behind those in the middle of the super. A rather better way than any of the foregoing is by means of section holders, which are simply half-depth frames, having no top bar, and eight of them, containing each four section boxes, fit exactly in a ten-frame hive, each super consequently holding thirty-two sections for comb honey.

But one of the latest methods of producing comb honey is by means of section holders combined with the fence (cleated separator) and plain $4\frac{1}{4}$ by $4\frac{1}{4}$ by $1\frac{1}{2}$ section boxes. This device is meeting with favour among beemen, and certainly has points that the other methods are without, one great objection to the older styles being that each section box is shut off into a room or compartment by itself, as the separators in them are solid right across the boxes, insets only being permitted for access of bees. But with the new cleated separator, as it is made up of wood slats a bee-space apart, ample means of communication is provided to the whole of the section boxes.

I now come to the arrangement I use myself, and herewith forward you a sample of the "Busy Bee" section holder, together with a section of comb honey raised in the same last season. The holders are intended for either plain or old style section boxes with insets, and each super will hold two dozen sections, which may readily be moved from side to centre as they fill. You will observe that the holders go crosswise of the hive, which makes no difference to the bees working therein, and also holds a better number for retail sale, there being quite sufficient for one customer. Another benefit I claim is that section boxes are kept perfectly clean on all sides, which saves much scraping of propolis and weather stain; in the ordinary design the top bar is absent, which leaves the top of the boxes uncovered, except by a mat, which is not always sufficient to keep them clean. I have also found that the multiplication of loose parts in making up a super adds to the work considerably, and a super fitted with Busy Bee holders has only 8 or 10 pieces, excluding section boxes, to the others—15 or 18 parts to be adjusted. There is also an arrangement that has lately come out called the "Ideal Super" with tall sections, which are $3\frac{5}{8}$ by 5 by $1\frac{1}{2}$ inches, and the super is $5\frac{3}{4}$ inches deep. It is fitted with plain sections and fences the same as the other, but I would hardly advise its extended adoption by bee-keepers, as it would be uninterchangeable with the usual super, and would mean a great deal of trouble in consequence.

Plate LXII

APPLIANCES FOR RAISING COMB HONEY.

Plate LIX.

NEPENTHES CHOLMONDELEYI. Bail.

Plate LX

CLIMBING BUCKWHEAT (*Polygonum Convolvulus*).

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

By F. MANSON BAILEY, F.L.S.,
Colonial Botanist.

Order NEPENTHACEÆ.

(Pitcher-plant Family.)

NEPENTHES, Linn.

N. Cholmondeleyi, *Bail.* (n.sp.) Plate LIX. Judging from the specimens to hand, the stems of this pretty little species are probably numerous from each rhizome, and under 6 in. high; the shorter ones with a dense almost rosette of leaves at the top, the taller ones with two such tufts of leaves—one near the base, the other at the summit of the stems. Leaves with scattered hairs, shortly clasping the stem, the broad portion falcate, $1\frac{1}{4}$ to $2\frac{1}{2}$ in. long, 2 to 4 lines broad near the middle; longitudinal nerves 4—2 on each side distant from the midrib—bearing an erect pitcher sessile at the end, or the pitcher removed by the elongation of the midrib, from 2 or 3 lines to $1\frac{1}{2}$ in., this extension of the midrib seems only to occur in the upper leaves; margins bordered with scattered or close, regular hair-like teeth. Pitchers 9 to 13 lines long; diameter above the base $2\frac{1}{2}$ to 4 lines, thence slightly contracting to the orifice; anterior ribs with prominently toothed wings, the reticulation well marked; peristome normal; operculum nearly orbicular; posterior spur recurved, broad at base, point filiform, with 2 prominent weak bristles on either side.

Hab.: Cape York Peninsula, 5 miles south of the Jardine River, *Cholmondeley Jardine.* To Mr. F. L. Jardine and his family we are indebted for almost all we know of the Queensland species of this most curious and interesting genus. When I paid a visit to Somerset, now only three years ago, but two species—viz., *N. Kennedyana*, F. v. M., and *N. Bernaysii*, Bail.—had been described. Now, through the untiring assistance which I have received from the above I have been enabled to increase the number to eight.

NOXIOUS WEEDS.

By F. MANSON BAILEY, F.L.S.
Colonial Botanist.

CLIMBING BUCKWHEAT *(POLYGONUM CONVOLVULUS).*

Plate LX.

During the present season this troublesome weed has been observed to be making headway about Brisbane, and if not checked will soon become as troublesome a pest here as in Europe and America. It flowers and produces perfect seed when only a few inches high, and continues to produce until the hot weather puts an end to its existence, by which time, however, a large quantity of seed has been ripened to infest the ground the following spring. The accompanying illustration by Mr. Wills gives a good general view of the plant when it finds anything to twine upon. Its stems are angular, and the leaves arrowheaded-heartshaped; its nuts or seeds triangular and black, and scarcely exceed the twelfth of an inch in length. Root annual In Europe it is troublesome in wheatfields by twisting together the stems and foliage into a mass, and thus preventing their growth, at the same time robbing the soil of the nutriment intended for the grain crop.

AN ABNORMAL GROWTH IN A PAPAW FRUIT.

By F. MANSON BAILEY, F.L.S.,
Colonial Botanist.

PLATE LXI.

On opening a papaw fruit the other day, Mr. Peter McLean was surprised to find what appeared to him as two small fruits inside; and, as it may be of some interest to readers of the *Journal*, an illustration of them is here given. It would have been better to have photographed the fruit with these growths *in situ*. It will be noticed that they have the appearance of two half-fruits rather than whole ones, thus their formation can be more easily explained.

At some time during the growth of the fruit, two of the five placentas have by some means become detached (except at the ends) from the common pericarp or fleshy part of the fruit, and formed independent pericarps of their own. By referring to the plate, it will be observed that the change in the placentas has had no effect upon the ovules or seeds, which remain normal in position and form.

It is a curious freak, and will doubtless interest persons fond of such things.

A NEW GUINEA FOOD PLANT.

By F. MANSON BAILEY, F.L.S.,
Colonial Botanist.

By the kind permission of His Excellency the Lieutenant-Governor of New Guinea, G. R. Le Hunte, Esq., C.M.G., I am enabled to give an account of a species of banana, the root-stock of which is said to furnish a good food. The letter containing the account was received by His Excellency from Mr. Samuel Tomlinson, of the Anglican Mission at Cape Vogel, who states that " . . . *Akarela* or *Bagana* is the root-stock of the cooking banana plant, and seems to be the chief food of Mukawa. After the fruit (which is kept for special occasions) has been taken off the tree, the latter is left standing for the sake of its root-stock. . . . When the young plants are taken up for transplanting, a portion of the root-stock is cut off. The stem is then re-planted, and forms a fresh root-stock, which is also cut off after the plant has fruited. . . . Mode of preparation: When the plant is taken up it is cut across at the bottom of the pithy stem, and all the outside is removed. In the case of young plants the *Akarela* is only boiled, but with old plants it is generally roasted, and afterwards cut up and boiled, although sometimes it is only boiled. No special reason can be given for the roasting and boiling. Mukawa people say that it is more satisfying than yams. . . . "

Of course until I receive specimens of the plant I cannot say whether it is a true banana (*Musa*) or not, as several plants are called bananas which are not even related to that genus.

His Excellency informs me that he is propagating the plant at Port Moresby, with a view of sending a number to Queensland.

Plate LXI

ABNORMAL GROWTH IN A PAPAW FRUIT.

Tropical Industries.

PRIZE ESSAY BY A FARMER ON SUGAR-CANE CULTIVATION.

In the interests of those about to engage in sugar-cane farming, we reprint from the *Cairns Morning Post* the following replies to ten questions propounded by the Colonial Sugar Refining Company in connection with the Cairns annual show. The company offered a prize of £3 3s. for the best set of answers. There were eight competitors; and the judges were Mr. Brookes, overseer in charge of Kamerunga State Nursery, and Mr. Clark, cultivation overseer at Hambledon:—

The answers were sent in under a *nom-de-plume*, proper name and address being enclosed in a sealed envelope, not opened until after the prizes were awarded. *Bonâ fide* farmers only were allowed to compete. Mr. Thomas Binnie, cane farmer, Hambledon (under the *nom-de-plume* of "Humus"), secured first honours with 72 marks out of a possible 100; Mr. C. R. Spencer, Aloomba, annexing second prize with 70 marks. We now append Mr. Binnie's answers, and while doing so take the liberty of recommending our farmers to give the matter careful study. Should any of our readers differ from Mr. Binnie in any detail, we will be glad in the interests of the farming community generally to publish their ideas.

QUESTIONS AND ANSWERS.

1. Why should cane trash not be burnt off but returned to the soil?

Answer.—As trash contains over 50 per cent. of the plant life taken from the ground, this is completely lost by burning; and by ploughing it in, this amount of humus or plant food remains to feed future crops. Fire frees a large quantity of nitrogen, which is one of the principal agents in plant growth, so that by burning we allow this to escape into the air, and it is lost. In heavier soils the burning of trash has the further advantage of loosening the soil and allowing the atmosphere to penetrate and sweeten it.

2. Why should green manure crops be ploughed into the soil before planting the cane?

Answer.—The advantages of green leguminous crops are:—1st. They draw atmospheric nitrogen and store it. 2nd. They send down roots into the subsoil, loosen and obtain potash from it. 3rd. They generally enrich the soil with vegetable matter or humus, thus supplying plant food and enabling the land to retain moisture.

3. Why are artificial manures used in cane cultivation?

Answer.—Fream, in his "Elements of Agriculture," says: "Though a soil may contain an abundance of the constituents of plant food, it is only those that are dissolved in water that can permeate through the plant and aid in feeding it. The object of the cultivator in his treatment of the soil by tilling, manuring, and fallowing is to provide a succession of available plant food, so that as the nitrogen, phosphorus, potash, lime, and all other matters existing in the soluble form are used up, fresh supplies may be ready to take their place." And in order to do this properly we have to consider that as the digestive organs are to animal life, so are rootlets to cane growth, and in order to render this growth healthy it is necessary to feed these rootlets with an easily digested food, and as they can only feed on substances dissolved by water we supply them with artificial manures which chemistry and experience teach us (with due regard to climatic and soil conditions) will assist to dissolve those substances and will supply the necessary food our soils have been denuded of and are naturally deficient in, and which are soluble by a minimum of water.

4. Which are the best kinds of artificial manures for plant and ratoon cane respectively?

Answer.—The artificial manure most suitable for plant and ratoon crops in this district is yet in doubt, but from my experience I am of opinion that meatworks manure is an exceedingly profitable manure. I think good results are to be obtained by giving the land a top dressing of lime just before planting, as lime naturally works its way down through the soil, and dusting from 5 to 6 cwt. of meatworks manure per acre into the plant drills. Any manure containing blood refuse, soda, nitrogen (ammonia, &c), potash, and lime in reasonable quantities must be of advantage to either plant or ratoon cane.

5. Why is it inadvisable as a rule to take more than three crops from one planting?

Answer.—As it is necessary for good cultivation to break up the soil to the air, and to sweeten the refuse from preceding crops by exposure to the action of the atmosphere, and it being impossible to do this thoroughly in ratooning, it is necessary to plough out to prevent the land from becoming sour and exhausted. Cane from its nature makes its best growth from new stems or suckers each year; and as these naturally make out for fresh soil, it follows that with the continual forcing of the growth back by ratooning onto the parent set or plant the produce must degenerate. All canes are surface feeders, and continual ratooning leaves the cane on high ridges, and makes it impossible to supply the ratoons with proper nourishment. If the soil is not well worked, grubs and other vermin as well as disease to cane are likely to be encouraged.

6. What is the object of scarifying between young cane rows?

Answer.—The principal object in scarifying between the rows are:—1st. To keep the ground in good tilth. 2nd. In dry weather to form a dust blanket on the soil, thus, by lessening evaporation, retain as much moisture in the land as possible to assist in dissolving the plant food. 3rd. To keep down weeds which would either choke the plants, rob them of moisture, or cause heavy expense in getting rid of them by hand labour.

7. State opinion for and against top and bottom trashing.

Answer.—In my opinion it is of the greatest advantage to the farmer to trash his cane when it has grown to the length of from 2 to 3 feet, as by so doing you let air and light into the cane, both of which are conducive to growth, you allow the young suckers to come away and make cane, and prevent water in the wet season from lodging around the cane inside the leaves, causing it either to throw out rootlets from the joints or to shoot from the eyes This trashing also leaves a protection on the ground for the cane when it falls over, and by keeping it off the damp ground prevents it from rooting where it touches the soil; it cheapens the top trashing required just before harvesting, and prevents loss by breaking, and finally assists and cheapens cutting, as if done properly, and the trash cleared well away from the stools, the cutter gets a clean blow at the roots of the cane, and thus does away with the evil of cutting high, and leaves him no excuse for not cutting below the ground. The great advantages of a top trashing or stripping, if done about a fortnight before harvesting, are that it enables the cane by exposure to the air to ripen up, it allows the cutter to top off the stick close to the green top, and enables the farmer to give satisfaction at the mill by not sending green unripened cane. This year I have tried an experiment in two trashings as against one. In one field I trashed early in April at a cost of 7s. per acre I left one acre untrashed. This week I have stripped the field at a cost of 6s. 6d. per acre, and put two boys on to the acre untrashed. It has taken them four days to do the work, which at 6s. per day means 24s. per acre for one trashing as against 13s. 6d. for the two.

8. Why should cane stalks be cut below the surface of the ground when harvesting?

Answer.—Cane stalks should be cut below the surface of the ground because, if stumps are left above the ground, the eyes or buds near the surface

sprout quickly and rob those lower down, and then die off in great numbers, while those left develop into thin whipsticks; whereas if the stalks are cut well under the surface the strong buds or suckers below that, having a good hold of the ground, will come up strong and healthy, and form stools for themselves, thus making heavy ratoons.

9. Which month is the best for planting cane in this district—and give reasons?

Answer.—A greal depends on the season, as to which is the best month to plant cane, but, taking the average season, in my opinion April and May are the best. My reasons are—This being the end of the wet season, the ground is naturally full of moisture, and the cold we have here, while it may check the upward growth, assists the young plant to gain a good hold of the ground and stool out, so that when the natural heat draws the cane upwards, having plenty of roots out to supply nourishment, good growth goes on all through the spring and summer. The cane is thus ready for a bottom trashing in February or March, and is well ripened up during any time in the following cutting season. Cane planted in April or May can, owing to the dry season which usually follows, be more easily kept free from weeds, which, of course, means cheapness, and, by the time the wet season comes on, cane so planted should have covered the ground and be out of hand and ready for the bottom trashing, which can be done more cheaply in the wet, and gives employment to your labour which cannot profitably be employed weeding, &c., at this season of the year. Many favour planting earlier in the season, but I do not agree with them, for the following reasons: You will have to do your ploughing in the wet, and land ploughed in heavy wet is like working up a mud pie; when dry weather comes it bakes like a brick. In heavy wet, weeds, in this climate, grow faster than the cane; and as they have to be kept down, the working between the rows adds greatly to expense, does not kill the weeds, puddles your ground, and does away with the good effects of your previous cultivation. I have always noticed that cane planted early shoots up quickly, and is from 2 to 3 feet high, when the cool weather checks the growth, which does not start in the cane again till the thunderstorms in November and December, and also that at all the joints that have grown before the check there are rootlets; the cane gets thin where checked, and when vigorous growth sets in is not strong enough to support the heavy cane above, and the result is you have crooked cane lying in all directions, more difficult to trash and cut than the later planted cane, and, as a rule, do not gain much weight, although the cane is older. The leaves of cane planted in April or May are well over the ground by the hot weather of October and November, and protect the roots and young shoots from the fierce rays of our tropical sun.

10. What is the latest month from the farmer's point of view for cutting cane, with due consideration for next ratoon crop? Give reasons.

Answer.—From a farmer's point of view all cane should be cut before the end of November, so that his work, ratooning, &c., should be done, and the ratoons be well away before the heavy rains of January have soddened the ground, and also to enable him to have taken advantage of the dry spells between thunderstorms (which usually occur in November and December) to keep his scarifier going to keep down weeds and sweeten the ground between the rows.

Regarding the papers sent in by the ten competitors for the Special Farmers' prize, presented by the C.S.R. Company, Ltd., we have, after careful consideration, decided to award as follows:—1st prize, Thomas Binnie, Hambledon, "Humus"; 2nd prize, Charles R. Spencer, Aloomba, "Striped Singapore." In making the awards the maximum number of marks given for each answer was 10; and the following is the order of merit according to the total number of marks awarded to each competitor:—"Humus," 72 marks (1st prize); "Striped Singapore," 70 (2nd prize); "Imprimatur," 67; "Agricola," 61; "Ceres," 59; "Baden-Powell," 59; "Solid Comfort," 58; "Lowlander," 49; "Auldpa," 39; "Canegrower," 38. The five questions

obtaining the best all-round answers were in the following order, viz :—Nos. 10, 8, 9, 1. 7 ; whilst the remaining five, which seemed to be of a more difficult nature, and apparently less understood by most of the farmers, came out in the following order, viz.:—Nos. 2, 4, 6, 5, 3. Trusting this will meet with the approval of your committee, we are, yours faithfully,

JAMES CLARK, } Examiners.
G. B. BROOKES, }

CHILE PEPPER CULTURE.

Mr. J. B. Neff, of Anaheim, California, discourses on chile pepper culture in the *Californian Cultivator*, on the basis of his own experience as a successful producer of hot stuff :—

How Plants are Grown.—A hot bed is made by excavating about 16 inches deep ; fill in to within 4 inches of the top with damp stable manure, tramping down very solidly. Spread about 4 inches of sandy loam over the manure. The seed is sown quite thickly over the loam, and then about ½-inch of loose sandy soil placed evenly over it, and all kept damp. When the plants have two or three leaves, thin to 1½ inches apart each way. The plants must be watered while in the hot bed by sprinkling. Great care should be taken to protect from frost.

Soil and Preparation.—Rich sandy soil is the best for the chile pepper. It should be ploughed deeply, and be put in a state of thorough cultivation. Ridges should be made 3 feet apart, and the plants set 2½ feet apart on the ridges. All plants must be on a water line, and to get this the ridges should be made, water run down the furrows, and the plants placed about 2 inches above the water mark. This insures every plant receiving water when irrigated. Plant as soen as danger from frost is past.

Cultivation.—Frequent cultivation is necessary until the plants get too large to allow of a cultivator and horse passing between the rows. All weeds must be pulled out. When the plants are set as before noted, all the ridges will be on one side. This must be worked down with a cultivator, and then a plough used to throw earth on either side of the furrow, so that the plants will be midway on the ridge.

Irrigation.—While the plants are small water will be needed about once in twenty days, but as they get larger it will be needed as often as once a week, though only in small quantities. The plant seems to have no deep roots, consequently the surface soil must be kept damp.

Picking.—The field should be gone over about once a week after the peppers begin to ripen, all that are fully ripe being taken off. Great care must be exercised to pick all the stem with the pepper. They should be allowed to lie in the sun one day after being picked in order to toughen the stems and prevent them breaking during the process of curing.

Stringing.—The common method is to cut strings of strong smooth twine 8½ feet long. Draw this through a needle about 12 inches long, which is often made of a bicycle spoke. Peppers having any breaks or blemishes must be thrown away, as they would decay before drying properly. Of course, where an evaporator is used these can be saved. After the strings are full and tied they are hung on nails driven into a rough pole or other framework standing about 6 feet from the ground, and left until dry ; or if shelter is available they may be moved before becoming fully dry and hung closely together until such shelter, but where there is a free cultivation of air.

Evaporating.—Many growers prefer evaporating instead of drying. The evaporators used are of various designs and sizes, but they should be large enough when the peppers are dried on strings to hold not less than 500 strings. The usual plan is to have a furnace with several turns of 8 to 10 inch pipe in the basement, the peppers being placed in the second story over a very open

floor and with good ventilation. The temperature must be kept at 110 degrees Fahr., and in this way the house can be refilled about every four days.

Yield and Price.—Both of these, of course, vary with the season, soil, and water supply. Two hundred and fifty strings of 5 lb. each is called a paying crop, but with all conditions favourable, including a late, warm season, as high as 400 strings, or even 2,400 lb. per acre, of dried peppers may be grown. Prices range from 35 to 75 cents. per string if sun-dried, and $7\frac{1}{2}$ to $12\frac{1}{2}$ cents. per lb. if evaporated.

THE COFFEE OUTLOOK.

Writing in *Planting Opinion* on the subject of coffee prices and the visible and invisible supplies of that staple, Messrs. W. H. Crossman and Bro., of New York, state as follows:—

We are able to understand why it is that Europe is anxious to advance the price of coffee and why they take exchange as a pretext, because they are holding not only the largest supplies ever known in the seaports, but the largest invisible ever held by the interior. The more coffee Europe has the more anxious they are to advance, but an advance under such conditions surely means that the anxiety is for the purpose of selling, for continued larger supplies are no argument for an advance—quite the contrary.

Regarding the prospects of the present 1900-1901 crop, we find there is a disposition to figure the outturn somewhat less than before. But in July, 1897, the highest estimates on the 1897-1898 crop were 7,500,000, yet it turned out to be 10,500,000 bags! The average opinion on the now current crop seems to be 8,750,000 to 9,000,000; but as we fell short during last crop owing to the lateness of arrivals from the present one—as the crops do not run strictly from July to July—there must be some allowance made which will or should be added to the total of the current crop, but whether the result is finally something below or above 9,000,000 bags is not of great importance. We have had four heavy crops in succession, leaving nearly 6,000,000 bags spot coffee in the seaports and the largest invisible supplies ever known. Such figures are no sound argument for the maintenance of present values. The coffee world is able to make some calculation with heavy spot stocks, coffee in sight, but the invisible supplies are a hidden danger, beyond all possibility of calculation.

It is not likely that after the interior has bought for four years at prices which they considered low, but which went still lower, they can be induced to pay higher prices, with heavy supplies apparent everywhere, and particularly so at the commencement of another crop that will probably be large also.

Unquestionably, sensational reports have been continually used to induce buying. Stories about the plague in Rio have been used incessantly. The real fact is the disease, under another name, has existed in Brazil as long as Brazil has been known. When it was found it could be used for interested purposes it has been made to answer. But, if scientific men in Europe and in the United States do not take any notice of it, we don't think the trade need employ it, for, on the contrary, efforts made under such pretences should be a warning that the supplies of coffee in the world are so large as to require stimulus of this nature.

The coffee trade is intelligent enough to understand that after four consecutive large crops another one (a fifth large crop) cannot be sold at an advance simply because the rate of exchange, that is the value of the milreis itself in Brazil has risen. It must be to the benefit of Brazil if they get 40s. for No. 7, instead of 23s. for the same quality of coffee as last September. The decline previously in exchange, which gave the high currency prices, was largely the cause of the enormous increase of production in Brazil, and as the plantations still exist there, and the fruit will be growing for years to come, a proper change in values can only occur on a sound basis, that is by reason of greatly reduced production, in conformity with the wants of consuming countries—something that has not yet occurred.

The visible supplies in the seaports are very large, in addition to which there are extraordinary invisible and interior supplies, and it is highly improbable that a constant increase of visible or invisible supplies will occur at advanced prices.

All the arguments about higher rates of exchange, bubonic plague, or any other points of that nature, must yield to the natural question of supply and demand.

KAMERUNGA STATE NURSERY AT THE CAIRNS SHOW.

The most interesting exhibits in the hall by far were those of the Kamerunga State Nursery and the Colonial Sugar Refining Company's Hambledon plantation, which occupied the centre stand through the whole length of the building. The State nursery exhibit, which was in charge of Mr. G. B. Brookes, the overseer, was exceedingly well arranged, and consisted of two tiers, upon which were placed bags and specimen jars of all kinds of products of the nursery gardens and fields. The exhibit, amongst other tropical products, included specimens of turmeric, manufactured and in the root, five varieties of cow pea in pods and loose, pigeon pea, sword bean, West African oil-palm nuts, ground nuts, cotton in the pod and in the raw state, divi divi (a powerful tanning agent), a large variety of heads of sorghum and sorghum seeds, a large variety of grass and other seeds, three varieties of pepper, cocoa in the pod and in the bean, cloves, mace, nutmegs, vanilla, twelve varieties of beans, a fruiting head of West African oil-palm, together with a specimen of the oil produced from the nuts, raw arrowroot and its manufactured product, india-rubber, ginger, tamarind pods, cassia pods, copra, and a lot of other products that space will not allow us to mention. Mr. Brookes stated that all the plants enumerated were available for distribution to anyone desirous of obtaining them. In the centre was hung a trophy of leaves from six varieties of aloe plants, and specimens of the fibre manufactured from them were hung around in festoons. The aloe family grow well in the poorest soils, the fibre is valuable, and the cost of manufacture comparatively small. Surely, here is a new industry going a-begging. Tea was shown in the green leaf and also manufactured, the latter being fine flavoured and having a good aroma. Coffee had a prominent place, and came in for a large share of attention from those attending. As showing what valuable fibrous plants are growing freely in this district, specimens of fibres were shown obtained from sisal hemp, wild banana, pink or common burr, sida retusa, fourcroya, pineapple leaves, Chinese burr, annatto, and Manila hemp.

There was a large collection of young growing plants, including 5 varieties of rubber trees, 8 varieties of beans, 3 varieties of palms, pepper, vanilla, and cocoa. An interesting item for farmeas was a trophy of chaffed fodder plants comprising velvet bean, cow pea, Guinea grass, Russell River grass, red Natal grass, and cow pea and Guinea grass mixed. These were arranged in small bags, and smelt sweet and wholesome. Some fine specimens of cassava roots, together with the manufactured article (tapioca), were shown, one root measuring 4 feet in length by 4 inches in thickness. Another interesting exhibit was a trophy of preserved bananas in jars and boxes, together with some banana-meal, which were recently received by Mr. H. Newport from Jamaica. This is another industry that could be profitably carried on locally. The stand was decorated artistically with different kinds of palm leaves and other plants growing in the nursery, and the exhibit was most instructive. Some very pretty framed photographs of different parts of the nursery, and of growing trees and plants, helped to make the whole thing more effective.—*Cairns Morning Post.*

The editor comments on the above exhibit, and remarks: The thought struck us that the Agricultural Department might with advantage prepare a handbook, confined solely to the exhibits as shown by the Nursery management --detailing information as to methods of planting, value in Australia and London, quantities and values of the various articles grown and exported by other tropical centres, and generally pave the way for the footsteps of possible growers. Our settlers know practically nothing about the economic value of, say, ground nuts, divi divi, ramie, cloves, nutmegs, vanilla, and such like. They saw splendid samples of various fibres made from locally grown cultivated and

uncultivated plants, but know practically nothing of the art or cost of preparing them. Ginger grows in this place like a weed, but few or any know its worth, or how to prepare it. If the West Indies can export this class of commodities so can we, but we must first be taught the way to grow and prepare them for market. If the late Cairns show did nothing else than present the Hambledon and Kamerunga exhibits to the public it would have done excellent work.

REPORT ON WORK AT THE SUGAR EXPERIMENT STATION, MACKAY.

PLOUGHING-IN THE VELVET BEAN.

By A. A. RAMSAY,
Manager of the Sugar Experiment Station, Mackay.

The following crops have been grown at the station, and have been successfully ploughed-in with the "Secretary" disc plough:—

Cowpea	which yielded	11 to 12 tons per acre
Small Mauritius Bean	,,	13 to 14 ,, ,,
Velvet Bean	,,	18 to 18¼ ,, ,,

After trying many methods, the one we have decided upon adopting is the following :—

When a field has been ploughed into beds, say, half-a-chain or it may be a chain wide, and the green crop has been sown in drills, we commence by turning a furrow off the outside of the bed, using the waterway between these beds for the furrow-wheel to run in. The first furrow will not, probably, be so deep as subsequent ones, but the second furrow will be deeper, and, having got this start, very little trouble is experienced. When the crop is turned in at the proper time, and is green, no trouble at all is experienced, except a slight tendency at times in the green crop to pack between the disc and the frame. To overcome this, the ploughman carries a short stick with which to clear this should any packing occur.

When the crop was too old or dry, some trouble was experienced by the vine dragging at times, and which had to be cleared.

In the case of a field ploughed on the flat, the plan that we have adopted, after several trials, is to cut a line down the middle of the field and to throw the vine back from 4 to 6 feet. A two-horse plough is then used to open two furrows—one on either side of this line, and pretty close together; this for the furrow-wheel of the disc plough. We arrange that the vine is thrown sufficiently back to enable one furrow to be thrown by the disc without interfering with the green crop. Into this first furrow thrown by the disc plough we put that portion of the green crop we had at first cleared back, and the next furrow thrown by the disc plough will completely cover the vine so placed, and leave a nice clear face to continue the work, which proceeded smoothly.

In these operations, the scraper which is supplied to prevent soil adhering to disc was removed, and the subsoiler lifted up as close to the disc as possible. If the subsoiler has been much worn by previous use on the farm, it will be most necessary to have it drawn out before commencing work of ploughing in such green crops as before mentioned. A furrow turned by the plough here is about 18 inches wide, and is 14 to 15 inches deep, though we have turned a furrow leaving a face right along the length of 16 to 17 inches deep.

On one block of land which had a very heavy crop of cow pea, comparative trials were made with (1) a two-horse sowing plough, (2) by a sulky plough, (3) by the disc plough. Visitors to the station were impressed with the superiority of the work done by the disc over the two others; and when the various work was examined more closely, the superiority of the disc plough was more striking still.

A farmer told me he could walk blindfold over the land and tell where the work of the disc plough started and where it ended, and so indeed you could.

Unfortunately the station does not possess a dynamometer, and consequently I cannot give the draught of the instrument, but our work here has been done by three good horses.

SUGAR EXPERIMENT STATION, MACKAY.

Report on Crops for Month ending August, 1900.

Name of Crop—Block.	Planted.	Area.	Drilled or Broadcast.	Manure Applied.		Rainfall during Month.	Treatment during Month.	Growth during Month.	Remarks.
				Name.	Per Acre.				
		Acr's			cwt.				
Sorghum A2	28-4-00	·20	Drilled...	None ...	...	1·175	Scarified	Very little	After showers towards end of month began to shoot.
Cow Pea A3	28 9-99	·60	,,	,, ...	...	...	...	...	Ploughed under.
Small Mauritius Bean ... A3	1-11 99	·05	,,	,, ...	...	...	...	...	Ploughed under.
Velvet Bean A4	1-11-99	1·89	,,	,, ...	...	...	..	...	Ploughed under.
Small Mauritius Bean ... $B2^{2}$	18-9-99	·31	,,	...	...	...	...	...	Using vine for horsefeed.
Small Mauritius Bean ... B3 4	14-8-00	3·50	,,	...	...	...	...	...	Previous crop of cow pea ploughed in.
Cane A5, B5, C5	24 8-00	1·60	5 ft. 6 in. drills	,, ...	...	...	...	...	Velvet bean been ploughed in, and all available New Guinea varieties of cane planted.
Small Mauritius Bean ... C2 3 4	14-11-99	1·36	Drilled...	...	...	...	...	A little ...	Seed been collected from this, and lot more now available.
Cow Pea ... ... Outside	25-4-00	0·75	,,	...	...	...	...	Vining since the middle of month	A poor crop on the whole.
Grape Vines	..	...	...	...	...	...	Manured and ploughed	...	
Thirteen Orange Trees	...	...	...	..	...	...	...	...	Forked round these, and kept free from weeds.
Cane B0	5-5-99	1·10	...	..	...	...	...	...	Some cut for plants, and some for analysis. Poor crop on the whole.
Cane ... ... Laboratory	May, '99	...	...	...	...	...	...	...	Some cut for analysis.
Pineapples B0	...	·20	...	...	...	...	Scarified & weeded	...	Making very good growth.
Cane ... ... Laboratory	20-6-00	...	...	...	...	..	...	Good ...	Four short rows of Yuban cane from Natal.
Cane "D74" ... ... Laboratory	13-8-00	...	...	...	...	...	...	Fair ...	One short row of "D74" from Acclimatisation Gardens, Brisbane.

REPORT ON EXPERIMENTS FOR MONTH OF AUGUST, 1900.

Purpose of Experiment.	Name of Crop Operated upon.	Area.	Planted.	Drilled or Broadcast.	Manure Applied.	Method of Application.	Treatment during Month.	Rainfall during Month.	Growth during Month; with Details of Results of Experiments and Remarks.
		sq. yds.							
As previously detailed	Madagascar Bean...	2	8-3-00	Broadcast	Nil	...	...	1·175	
	White's Perennial Cow Pea	2	8-3-00		,,				
	Velvet Bean ...	2	8-3-00		,				
As detailed ..	Cane	...	In boxes of sand.	...	As detailed previously	...	...	...	Cut 28th August; 9 lb. 1 oz. = 2·01 times as much cane as unmanured.
	,, ...	...							Cut 28th August; 16 lb. 2 oz. = 3·58 times as much cane as unmanured.
	,, ...	...							Cut 28th August; 6 lb. 9 oz. = 1·45 times as much cane as unmanured.
	,, ...	...							Cut 28th August, 4 lb. 8 oz. =
As detailed ...	Cane	sq. ft. 1·46	25-4-00	...	As detailed previously	..	...	...	No. 1 decidedly the best. Beginning to stool.
	,, ...	sq. yds. 1·46	25-4-00						Not much better than No. 6.
	,, ...	1·46	25-4-00						,, ,, ,,
	,, ...	1·46	25-4-00						Nearly as good as No. 1.
	,, ...	1·46	25-4-00						,, ,, ,,
	,, ...	1·46	25-4-00						Not very good.
	,, ...	1·46	25-4-00						

In these experiments the average loss of water from boxes 1, 2, 3, 4, 5, 6 was 21·94 lb. = 2·89″ of rain; while the water lost by evaporation in No. 7 was 17·48 lb. = 2·19″ of rain. The difference used by the crops was 4·46 lb. = ·70 of rain.

REPORT ON CROPS FOR MONTH ENDING SEPTEMBER, 1900.

Name of Crop—Block.	Planted.	Area.	Drilled or Broadcast.	Manure Applied. Name.	Manure Applied. Per Acre.	Rainfall during Month.	Treatment during Month.	Growth during Month.	Remarks.
		Ac'rs.							
Sorghums and Millets ... A2	3-9-00	·12	Drilled	None ...	...	·625	Disc up centres of rows	Fair ...	These consist of 2 rows Amber cane, 2 rows Giant Panicum, 2 rows Orange cane, and 1 row Dakota millet.
Sorghum A2	28-4-00	·20	,,	,, ...	...	...	,, ,,	...	Being cut for horsefeed.
Cane A5, B5, C5	...	1·70	...	,, ...	...	...	Worked disc harrow	Good ...	This consists of all available canes on the station, to compare with same canes to be planted on adjoining piece of land early next year.
Small Mauritius Bean ... B1	..	·60	...	...	...	...	Nil	...	Crop self-sown. See these reports, 31st July, 1900. Balance of field in hand for sowing.
23 Trial Rows of Sorghum, &c. $B2^1$	...	·14	...	...	...	...	Disc up centres...	Good ...	4 rows Amber cane, 4 Giant Panicum, 4 Orange cane, and 7 Dakota millet—23 rows.
Velvet Bean ... ... $B2^1$	...	·36	...	...	...	...	Nil	...	Self-sown from previously. See these reports, 31-7-00.
Small Mauritius Bean ... $B2^1$	...	·10	...	...	...	...	,, ...	...	,, ,, ,,
Small Mauritius Bean ... $B2^2$	18-9-99	·31	...	...	...	...	Collected most available seed, and then ploughed under	...	Ploughed under, 27-9-00.
Small Mauritius Bean B3 and 4	...	3·50	...	...	...	...	Worked disc harrow		
Cow Pea ... ... Outside	25-4-00	·75	...	...	...	...	Nil	...	Of little value as green manure crop.
Small Mauritius Bean C2, 3, 4	14-11-99	1·36	...	...	...	...	...	...	Abundance of seed on this ready to pick.
Grape Vines	...	...	...	Wood ashes	1	...	Tie and shorten laterals		
				Am. sulphate	1	...	Scarify, manure, and water	Very good	
13 Orange trees	...	...	..	Nil	...	...	Forked	,,	To those who have seen these trees they have been an object lesson in benefits of cyaniding.
Pine apples B0	...	·20	...	Nil	...	...	Scarified and weeded	,,	
Cane B0	5-5-99	1·10	...	,,	...	...	...	...	Some cut for horsefeed.
Do. Yuban .. ... Laboratory	20-6-00	...	...	,,					
Do. D74 ... ... do.	13-8-00	...	...	,,					
Do. ... ... do.	0-5-99	...	...	...	...	...	Washed	..	Collection New Guinea canes, &c.; been analysed, &c.

Report on Experiments for Month of September, 1900.

Purpose of Experiments.	Name of Crop Experimented upon.	Area.	Planted.	Drilled or Broadcast.	Manure Applied.	Method of Application.	Treatment during Month.	Rainfall during Month.	Growth during Month; with Details of Results of Experiments and Remarks.
	1. Sport Black Mauritius Bean								For yield see Report, 31st July. Analysis, see separate sheet
	2. Poor Man's Bean	All these	harvested, 20-7-00			...	...	·625	ditto ditto
	3. Narico Bean ...								ditto ditto
	4. Small Mauritius Bean								ditto ditto
	5. Madagascar Bean	...	...	.	...	...	...	...	Though only 2 seeds grew (see Notes 31st July, 1900), we cut this on 25th September, and obtained 8·69 lb. vines, ·44 lb. roots, and 2·38 lb. seed = A return of 40·333 per cent. on seed planted
	6. White's Perennial Cow Pea	..	...	..	..	...	...	...	Seed-pods ripening just now
	7 Velvet Bean								
	No. 1 Cane ...	1·46	25-4-00						
	No. 2 ,, ...	1·46	,,						
	No. 3 ,, ...	1·46	,,						
	No. 4 ,, ...	1·46	,,	...	...	...	..	...	Very good growth
	No. 5 ,, ...	1·46	,,	...	..	...	..	...	Very good growth
	No. 6 ,, ...	1·46	,,						
	No. 7 ,, ...	1·46	,,						

For Month of September—

Loss of water from boxes 1, 2, 3, 4, 5, 6	31·45 lb.	= 4·14″ of rain
Loss of water by evaporation from box No. 7 ...	23·38 lb.	= 3·08″ of rain
Difference (used by plants)	8·07	1·0

ANALYSIS OF CROPS OF NARICO, POOR MAN'S, BLACK MAURITIUS, AND SMALL MAURITIUS BEAN, GROWN AT THIS STATION, REFERRED TO IN REPORTS MARCH TO SEPTEMBER, 1900.

—	Narico Bean.		Poor Man's Bean.		Black Mauritius Bean.		Small Mauritius Bean.	
	In Original Vine.	Calculated to Dry Matter.	In Original Vine.	Calculated to Dry Matter.	In Original Vine.	Calculated to Dry Matter.	In Original Vine.	Calculated to Dry Matter.
Organic matter (1)	20·07	...	20·00	...	19·65	...	16·48	...
Ash	2·17	...	2·08	...	3·25	...	2·88	...
Moisture	77·76	...	77·92	...	77·10	...	80·64	...
	...	...	...	...	...	...	...	...
(1) Containing nitrogen	·6903	3·104	·6510	2·948	·7790	3·401	·6017	3·108
Yield of vine in tons per acre	9·59		14·38		15·56		25·59	

THE WORLD'S RUBBER SUPPLY.

The total world's supply of rubber to-day is about 120,000,000 to 130,000,000 lb., valued at about £15,000,000, says the *Home and Colonial Mail*. At the present time lactiferous plants yielding "caoutchouce," or "rubber," are being worked for commercial purposes in Brazil, Bolivia, Central America, East and West Africa, whence come the chief supplies, whilst Guiana, the Eastern Archipelago, Madagascar, India, and Ceylon contribute a small quantity to the general stock. More than half the total supply is exported from the Amazon district. Owing to the recuperative power of the tree, it is improbable that the available supply of rubber from the Amazon valley will be exhausted in the near future; also the enormous area over which the estates extend makes it unlikely that unexpected events should occur by which the industry as a whole would be damaged. For the same reason, and owing to the scarcity of labour, it is improbable that any very sudden increase or decrease of the annual production will occur. The tendency is at present for a slight increase of the total production each year.

RUBBER FROM BRAZIL.

The *Engineer* says:—"The export of india-rubber from Brazil continues to augment yearly. The value of this article exported in 1898 was £34,557 against £19,223 in 1897"; and, alluding to the gutta-percha trade, says that "an acceptable substitute for gutta-percha is reported to have been invented by a Strassburg engineer. Under ordinary temperature the mass is said to be hard, like pitch, and at the same time not brittle."

THE REVIVIFYING POWER OF SUGAR.

Experiments have been made by Professor Mosso, at Genoa, to test the food value of sugar in cases of exhaustion from hunger. His results confirm the theory that sugar is assimilated by the exhausted system more rapidly than bread, and showed a rapid rise in temperature within ten or fifteen minutes after a small quantity of sugar was eaten by a long-fasting animal, the effect reaching a maximum in one to two hours. Sugar restored life to dogs suffering from loss of vital heat, when albumen could not save them.—*Sugar.*

Forestry.

SOME TIMBER TREES OF QUEENSLAND.

By J. W. FAWCETT,
Member of the English Arboricultural Society.

THE SILK COTTON-TREE (*BOMBAX MALABARICUM*, DC.).

Botanical Description.—The Silk Cotton-tree is a large tree, attaining a height of from 60 to 80 feet, with a diameter of from 20 to 30 inches with the branches in whorls, the younger branches often being covered with short conical prickles.

Leaves.—The leaves, which are deciduous and of a deep green, are composed of from five to seven leaflets, placed at the end of a rather long stalk.

Flowers.—The flowers are large and red, and are arranged in clusters on short stalks at the ends of the branches when the tree is destitute of leaves.

Fruit.—The fruit is a large capsule, oblong in shape, containing a number of obovoid seeds enveloped in a silky cotton or wool.

Vernacular and Scientific Names.—The Silk Cotton-tree is so called because the seed capsules contain a cottony or downy substance like silk. It is also called Red Cotton-Tree, from the colour of its flowers. The generic name, *Bombax*, was given to these trees by Linnæus, from the beautiful, soft, shining substance which envelops the seed vessels, resembling raw silk. The specific name, *Malabaricum*, was given to this species by De Candolle, from its occurring on the Malabar coast of India.

Distribution.—The Silk Cotton-tree is found in the scrubs in the coastal districts of North Queensland, and also in North Australia and throughout Burmah and India.

Uses.—The Silk Cotton-tree yields a soft, coarse-grained, light timber, which is not considered durable, except under water. In India it is used for planking, for packing cases and tea-boxes, and for laths for roofs, and is also employed in lining wells and in the construction of canoes.

The silky cotton or wool which envelops the seeds has too short a staple to be used in manufacture, but it is used in India for stuffing cushions, mattresses, and pillows, and for making quilts. It is known as simal, and is of considerable importance, being largely exported. According to Mahometan writers, the young roots of this tree have alterative, astringent, and restorative properties.

A brownish gum, called Muchurus, which exudes from the trunk, is used medicinally. It is considered a powerful astringent, and is used in diarrhœa, dysentery, and menorrhagia. It is sold in all the bazaars in India as a medicine. This tree is cultivated in many parts of India, Burmah, and the Indian Archipelago.

THE MILKY MANGROVE (*EXCÆCARIA AGALLOCHA*, Linn.).

Botanical Description.—The Milky Mangrove is a moderate-sized tree growing to a height of from 20 to 30 feet, with a diameter of from 6 to 18 inches or more.

Bark.—The bark is smooth, and contains a milky sap.

Leaves.—The leaves are obovate or oblong in shape, 2 or 3 inches in length and somewhat fleshy, of a yellowish colour.

Flowers.—The flowers are diœcious—*i.e.*, having the male and female flowers on distinct plants; the male flowers are in spikes 2 or 3 inches in length, and are of an orange colour; the females are in very short racemes. They are in flower from October to December.

Fruit.—The fruit is a capsule about a quarter of an inch in diameter.

VERNACULAR AND BOTANICAL NAMES.—The Milky Mangrove is so called from the acrid milky juice which exudes from the bark. It is also called the River Poisonous-tree or River Poison-tree, from its habit of growing on the banks of tidal rivers, and from the milky sap being of a poisonous nature. The generic name, *Excæcaria*, was given to this genus by Linnæus, the founder of botanical science, from the supposed effect of the sap, which is stated to cause blindness. The specific name, *Agallocha*, was given to this species by the same botanist after its Arabic name.

DISTRIBUTION.—The Milky Mangrove is a common maritime tree of the tropics, being found on the banks of the estuaries of saltwater creeks and rivers and swamps on the coast of Queensland. It is also found in New South Wales as far south as the Richmond River, and on the coast of North Australia as well as in New Guinea, the Malay Archipelago, and tropical Asia, especially India and Arabia.

USE.—The Milky Mangrove yields a light, soft, close-grained, easily wrought whitish timber, which, though little used, is useful for general carpentering and similar purposes, and for carving. The bark, by incision, yields an acrid milky juice, which is so volatile that no one, however careful, can collect even a small quantity without being affected. The symptoms are a sharp and painful burning sensation in the mouth and throat, followed by sore eyes and a severe headache. It is generally believed that a single drop falling into the eyes will cause loss of sight. I cannot vouch for this, but this I know: Should a very small "sparkle" find its way into the eye, a smarting, stinging sensation immediately follows, which increases in a few minutes to a most intense pain. Severe inflammation then sets in, and the eye becomes infected with blood until the whole of the eyeball is of a deep dark-red, and the water rushes from the eye in an almost incessant stream. This very often continues for hours during which the pain is terrible, when it subsides and the inflammation falls away. It is not, however, until the sufferer has had a good rest, and especially a sound sleep, that the eye begins to assume its mormal appearance. This milky juice is used as a medicine by the aborigines of North Queensland. At Townsville they employed it in the curing of certain chronic ulcerous diseases.

In India, where the sap is called "Tiger's Milk," it is said to be applied with good effect to inveterate ulcers. The leaves are also used in decoction for the same purpose.

From the milky juice a good caoutchouc or indiarubber may be prepared.

FORESTS AND MOISTURE.

By A. J. BOYD.

Although much has been written on the question of the connection between forests and rainfall, and many arguments, *pro* and *con*, have been brought forward, we seem to be no nearer to unanimity on this important subject. But there are cases in which argument brings enlightenment. It is easy to affirm that forests do not increase the rainfall or moisture of a district, but there are local conditions which have to be taken into consideration which materially modify any statement in favour of or against increased rainfall due to the timber covering of the soil. It needs no very acute reasoning to show, by an examination of our own forests and scrubs, that they are important factors in restraining evaporation, retarding or even preventing heavy floods, and the washing away of hill-sides, and consequently retaining the supplies of rivers and springs in the bowels of the earth. So much has been granted by all who have scientifically considered the matter. Compare a clear, open eucalyptus forest with no undergrowth with a dense vine scrub. The winds have free play through the former, whilst the heavy timber and undergrowth of the latter present an almost impassable barrier to even heavy gales. What is wind?

Wind is air in motion, and air in motion is a very rapid worker. As it sweeps over the bare surface of land or water, it carries away with it more moisture than is evaporated by the heat of the sun. Still air, on the contrary, very slowly absorbs moisture. The air in the scrubs is still, and hence the moisture in the thick carpet of humus in such places is very slowly evaporated, and is being constantly renewed by heavy dews and showers of rain, which supply far more than is carried off in the air. This gives the superabundant water time to sink slowly into subterranean reservoirs, which, being constantly saturated, are able to keep up the supplies drawn upon by streams and springs. When heavy rain is long continued, when there is little or no undergrowth, the surplus water rushes off the sun-dried surface of the soil, pours into the creeks, and swells their water faster than the rivers or lakes to which they are tributary can carry them off. Hence arise often devastating floods. In the scrubs, on the other hand, the flood waters are retarded by the undergrowth and the mat of roots traversing the soil like a close network, and before they can get away to the creeks in injurious bodies they sink through the porous soil to the regions below, and so are prevented from flooding the low-lying country.

Usually after heavy rain in Queensland, strong, drying, westerly winds sweep over the country, and the open forest is rapidly deprived of much of the moisture which has remained in the soil, and is left in perhaps a worse position than before the rains. The scrubs will not permit the drying winds to sweep through them, so that the moisture is retained in the soil. The still air above it absorbs this moisture very slowly until it has become saturated. Once the point of saturation is reached, evaporation ceases, and under certain conditions condensation and precipitation follow. This precipitation may take the form of heavy dews or of *rain*. In this sense, then, it may be asserted that forests increase the rainfall. Moist air being lighter than dry heated air, the former will ascend and assist in forming rain-clouds, which, when fully charged, and reaching a stratum favourable to condensation, must fall in the form of rain, but not necessarily in the district where they were formed. Having risen above the protecting influence of the scrub, they are caught by the winds and swept away, joining other clouds on their way. Perhaps they reach a high range, on which they impinge, and rolling upwards reach a cooler atmosphere, and at once condense and fall in grateful showers, perhaps 200 or 300 miles from the forests which gave them birth.

Professor R. C. Kedzie, Chemist of the Michigan Agricultural College, tried an experiment to obtain some measure of the relative rapidity of evaporation in a draught, and in comparatively still air. The air in one part of the chemical lecture-room was so nearly still that a feather would not move perceptibly. By opening windows in another part of the room, a strong draught could be obtained at one window, the wind blowing 12 miles an hour. Two square pieces of Turkish towelling of the same size were thoroughly wetted, just short of dripping, then weighed separately, one suspended in the still air of the room for an hour, while the other was similarly hung in the draught by the window, or in the mouth of the ventilating shaft. Both were left for an hour, then weighed again, and the loss in weight showed the amount of water evaporated in each case. The trial was made seven times, with the result that the evaporation was four times greater in the draught than in the still air. The actual amount evaporated was not the same for each hour, but the ratio of evaporation was almost identical in the whole series, viz.:—Four times as much in the draught as took place in the still air.

The reason for this is not hard to find. A volume of perfectly still air surrounding a wet body will take up moisture with progressive slowness till the air is saturated; but, if this damp air is blown away and replaced by relatively dry air, evaporation will go on with increased rapidity, and if the air is consantly renewed, as in a draught of wind, the evaporation will be more rapid. Every washerwoman knows that the clothes will soon blow dry when hung out in a stiff breeze, but will take hours if lined up indoors.

The principle of the professor's laboratory experiment, he says, will hold in the broad open of Nature. The air in contact with the moist ground will take up water till it is saturated, and then evaporation will be suspended, provided the air remains still and undisturbed. But, if this bottom air is swept away by wind, evaporation will be renewed, and the drying of the soil will again go on. The influence of trees, shrubs, and even of the grass in preserving in some degree this shallow pool of quiet air at the ground-level, and thus diminishing evaporation from the soil, may seem a trifling matter at first thought, but becomes of great moment on the large scale of Nature.

From this it will be seen that my theory is fully borne out by Professor Kedzie.

DEPLETION OF FORESTS IN NEW SOUTH WALES.

The Engineer-in-Chief for Railways, in New South Wales, Mr. H. Deane, has pointed out, in a paper prepared at the instance of the Minister for Works, the ever-increasing scarcity of timber suitable for railway sleepers, bridges buildings, &c. He says:—

The forests have now almost been entirely exhausted of timber anywhere within reasonable distance from the means of obtaining railway and steamship transport. Timber-getters and sawmill owners have to push further back into the country to obtain supplies for the constantly increasing demand. Especially is this the case with ironbark, but to a greater extent it also applies to other hardwoods.

And the time is not far off when, instead of New South Wales being looked upon as a country with a superabundant area of forests, it will reach the condition of those countries where more expensive materials have to be used for construction in substitution for timber.

The importance of this step is all the greater when it is considered how large a quantity of the colony's most valuable timbers are exported to other parts of the world, and of late particularly to New Zealand, and that, with the exception of the wages paid to timber-getters and the profits of timber merchants, the colony gains nothing herself, but is gradually being drained of one of her most valuable assets, and no steps are being taken to reaforest the districts as they become exhausted.

The ignorance of the benefits to be derived from proper management of the forests is very remarkable. We are possessed of timber which in strength and durability can vie with the products of all the world, and a large revenue could be made out of it. Forestry is, as has been happily said by Professor Bailey Balfour, a division of rural economy which ought to be the basis of a large national industry.

Forest conservation does not mean that no trees shall be cut down, but that the forests shall be cultivated as any other crop, and not wasted. Steps should be taken to prevent the spread of fire and the browsing of animals of all sorts on growing forests.

The matter is one generally for the State to take up; yet there are immense tracts under private control which would pay better as forest than as grazing land; and if proper instructions could be given, suitable schools of forestry instituted, men could be trained both for the employment of the State and to assist private owners. As the existence of even young plantations, which only their followers will reap the full benefit of, will mean the growth of to them an important asset, landowners should be taught to see that it is in the interests of their property to plant and conserve.

It is perfectly clear that, if on the forest land of the eastern slopes of the main range, where such land might be worth 1s. per acre for grazing purposes, it will pay to grow timber, then, in the interior, near the railways, the poor ridges, which are not worth 1d. per acre, would, if put under cultivation for trees, yield a very handsome profit indeed.

But it must be understood this expectation can only be realised if care is taken in growing the trees. They must be started in nurseries, planted out, and, until they have grown to a considerable size, must be properly fenced off, and

protected from the browsing and ravages of animals and man. Strict measures must also be taken to preserve them from injury or destruction by bush fires.

It is certain that if proper measures were taken a profitable industry could be carried on, giving employment to large numbers of men.

Mr. O'Sullivan thinks that Mr. Deane's report may prove of great service to the conference of timber-getters, saw-mill proprietors, and others that is to meet in Sydney shortly.

A REASON FOR FOREST CONSERVANCY.

That it is high time drastic measures were taken for not only nursing our forests, but for planting trees in place of those removed, will be seen from the present condition of the vast forests of the United States. There, the total forest area is estimated in round numbers at 405,000,000 acres, or 26 per cent. of the total area of the country; Alaska, 577,390 square miles, and the Indian reservations, 31,400 square miles, not being included. The present annual requirements for consumption of forest products in the United States are, approximately, over 24,000,000,000 cubic feet, made up of the following items:—Lumber market and manufactures, 5,000,000,000 cubic feet; railway construction, 600,000,000 cubic feet; charcoal, 250,000,000 cubic feet; fences, 500,000,000 cubic feet; fuel, 18,000,000,000 cubic feet; mining timber, 150.000,000 cubic feet. At the present rate of cutting, the remainder of forest land in the United States cannot long meet the enormous demand on its resources. Of the two most important timbers for building purposes, the merchantable white pine of the north-west and of New England is practically gone, very little remaining; and there remain of the merchantable long-leaf pine of the south only about 1,500,000,000 cubic feet. The valuable ash will probably be the first to be exhausted. Walnut and tulip trees are also on the wane. Forest fires are estimated to destroy values of about 12,000,000 dollars annually, but during the year 1894 that amount was lost in two States alone—Minnesota and Wisconsin.

Most of the States have awakened to the danger of the extinction of their forests, and have special commissions for their forestry laws. There also exists a national organisation known as the American Forestry Association, composed of delegates from all the States, which meets annually. In forty-four States the legislatures have striven to encourage tree-planting by appointing a certain day in the year, known as Arbor Day, for the voluntary planting of trees by the people. In Queensland we also have established an Arbor Day, but only for the beautifying of State school premises by the pupils. In the United States tree-planting has for its object the renovation of the forests, and is a very serious business. Large areas of timbered country, amounting in the aggregate to 21,379,840 acres, have been reserved by the State, and large sums have been appropriated for their survey and protection. Now, if an immense territory like the United States, once so heavily timbered in many parts that the idea of the forest supplies ever giving out was scoffed at as absurd, is alive to the stern fact that its timbers are practically exhausted, with how much greater reason should we in Queensland set earnestly to work to regulate the cutting of our forest and scrub timber, to preserve the young plants and saplings, to aid and stimulate their growth by judicious thinning and by planting suitable trees in various localities? Our Forestry Branch of the Lands Department has only just been created, but we have no doubt that, when the Conservator of Forests has had time to make a thorough examination of our remaining timber supplies, he will formulate such regulations as will have the effect of promptly putting a stop to the reckless waste at present going on in all but our protected bunya forests.

Pisciculture.

OUR FISHERIES.

Mr. D O'Connor, of Oxley, who takes considerable interest in fish acclimatisation, writes:—Queensland is strangely behind in developing her fishing industries. We have on our coast many excellent varieties of fish, and might, with a little judicious enterprise, add to them. The same ancient modes of capture obtain as were practised years ago. A long line is unheard of, and a trawl is not known to exist in Queensland. Without these effective engines, the London and some other markets would be poorly supplied with soles, turbots, and many others of their choicest fishes. It is in modern times that depressions in the sea bottom, between England and Holland, known as "The Silver Pits," were discovered; these areas have proved veritable goldmines, they have been worked for years without any apparent diminution to their riches, and in this respect are superior to goldmines. To these places fish of various kinds resort in winter, being attracted by the warmer temperature of the water and probably a greater abundance of food. The silver pits are worked mainly by means of the trawl, without which turbot, soles, flounders, and other kinds of choice fishes would be scarcer in the home markets. When are we to discover the "silver pits" off our coasts? Who will look for them? It is easy to predict that, when found, some very fine soles, flounders, and other first-class fish will be forthcoming. We seem to lack one thing—enterprise. Surely the increased price of meat should galvanise some of us into action. We have no longer the excuse of "No market," pleaded a few years ago, for, thanks to Messrs. Geddes and Co., we have been supplied with a convenient market with the invaluable adjunct of cold storage. Customers abound in all directions, and our excellent railways afford easy means of distribution. Yet the general complaint, a little way out of Brisbane, is, "We cannot get fresh fish."

The sea is close at hand, open, free to anybody and everybody—the harvest always ready to be gathered. Our Government have done much to assist the farmer and the miner; can they not do something for the poor fisherman? New South Wales is commendably alive to the value of her fisheries; her Commissioners have not confined their attention to the acclimatisation of different varieties of trout, English perch, &c., but have recently established sea hatcheries, and commenced by an importation of the celebrated Tasmanian and New Zealand fish, the trumpeter, and intend shortly importing from England that excellent flat fish, the plaice. This fish is so highly esteemed in the United States of America that the Fisheries Departments have imported and established it on their Atlantic and Pacific coasts.

Mr. Saville-Kent, some years ago, discovered halibut on our Northern coast —perhaps it will be found off Moreton Island when our professional fishermen use a longer line than is customary with amateur snapper fishermen. Much good might be effected if some of our enterprising young men would form a fishing club, and go some miles outside Moreton Island, and with a long line furnished with 1,000 well-baited hooks would test deep water.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1899.					1900.							
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.
North.													
Bowen	0·21	0·06	0·56	Nil	2·92	7·61	0·40	0·88	0·59	0·89	1·14	0·96	0·76
Cairns	1·31	3·23	0·74	0·33	4·57	43·06	1·98	8·90	3·77	3·56	1·66	0·20	Nil.
Geraldton	2·85	9·03	1·03	Nil	4·89	62·26	2·36	8·86	8·86	8·33	2·34	1·02	Nil.
Herberton	0·36	1·62	0·18	2·75	0·73	11·90	0·23	1·97	2·19	0·57	0·12	0·98	Nil.
Hughenden	2·05	Nil	0·45	1·05	0·33	6·43	1·04	0·01	Nil.	0·11	0·02	2·45	Nil.
Kamerunga	...	...	...	...	...	...	1·01	8·60	3·25	3·65	Nil.	0·18	0·03
Longreach	0·28	0·06	0·27	0·67	Nil.	1·68	0·48	Nil.	Nil.	0·14	Nil.	2·34	0·50
Lucinda	0·80	0·97	0·02	1·26	1·02	37·35	1·71	4·90	4·44	9·08	1·10	1·04	0·08
Mackay	2·37	1·33	0·19	0·49	7·65	20·86	0·65	4·12	2·40	2·89	2·00	3·25	0·74
Rockhampton	1·71	1·96	2·35	1·22	11·02	4·53	0·25	1·64	0·93	1·38	0·71	1·70	0·92
Townsville	0·89	0·01	0·35	0·16	0·53	21·09	0·07	1·68	0·87	2·31	0·41	0·57	0·12
South.													
Barcaldine	0·53	0·27	0·94	0·52	0·04	3·08	0·65	0·09	2·03	1·38	0·29	4·38	1·63
Beenleigh	2·02	3·11	2·53	1·80	7·40	5·42	3·19	3·16	1·25	7·55	2·18	4·77	1·06
Biggenden	...	...	...	...	...	...	0·40	2·81	0·28	3·06	1·43	3·23	0·98
Blackall	0·57	0·16	1·20	0·04	0·85	1·73	1·31	0·63	0·63	2·19	0·33	2·21	0·66
Brisbane	1·43	2·48	2·26	2·33	7·61	6·51	5·18	3·37	1·38	5·45	2 68	4·36	0·79
Bundaberg	2·62	1·67	1·60	0·06	7·62	4·63	0·86	1·86	1·15	3·97	1·46	5·20	1·14
Caboolture	1·90	2·40	2·30	2·23	7·44	3·04	4·18	5·66	1·42	7·04	2·14	3·73	1·56
Charleville	1·26	0·55	0·36	0·43	0·16	1·01	0·08	0·79	Nil.	1·15	1·31	1·80	0·13
Dalby	1·09	1·20	1·44	1·84	2·89	0·41	6·31	2·80	2·46	2·54	1·29	1·70	1·72
Emerald	2·08	1·96	1·93	1·32	0·40	3·08	1·22	3·97	0·42	2·72	1·15	3·96	0·52
Esk	1·69	2·79	2·67	2·25	5·34	1·42	2·34	4·73	1·50	4·78	1·89	2·85	1·39
Gatton College ...	1·55	2·19	2·13	3·50	5·87	2·40	4·07	3·13	2·24	4·24	1·15	2·73	1·33
Gayndah	3·34	1·24	2·73	4·59	7·37	2·52	2·07	1·11	1·22	2·57	0·88	3·36	1·42
Gindie	...	...	...	...	...	...	0·57	1·04	0·96	3·01	0·92	3·01	0·55
Gympie	1·23	2·11	2·41	0·39	6·44	5·59	1·84	2·76	1·05	3·63	0·82	3·34	0·84
Ipswich	1·29	2·77	2·04	3·46	4·66	2·79	1·66	1·85	1·47	4·73	1·45	2·25	1·17
Laidley	1·82	5·04	3·17	2·40	6·50	0·64	3·15	2·87	1·94	4·36	1·41	2·28	1·08
Maryborough	1·49	2·29	1·20	0·51	4·13	4·88	1·78	3·26	1·17	4·33	1·21	4·32	0·57
Nambour	1·81	3·13	2·87	3·03	11·11	4·07	5·64	4·67	2·78	7·77	1·35	3·42	1·81
Nerang	2·52	4·74	1·99	1·42	6·31	4·60	3·37	3·06	0·47	18·28	2·84	7·74	1·08
Roma	1·00	0·55	0·35	1·27	0·99	0·43	1·52	4·40	0·23	2·07	2·14	2·14	1·05
Stanthorpe	1·08	1·63	1·36	0·86	3·22	2·62	4·81	1·87	1·70	3·17	1·22	2·26	1·50
Taroom	1·60	1·55	0·83	3·32	0·65	1·78	3·65	2·92	2·11	2·55	1·40	2·46	...
Tambo	0·74	0·27	0·79	0·08	0·66	2·28	1·55	0·30	0·02	2·94	1·49	1·75	0·59
Tewantin	3·67	2·80	3·36	0·46	8·22	1·69	4·87	5·36	1·02	5·90	3·03	5·89	1·97
Texas	1·38	1·72	0·97	0·74	2·67	1·56	3·39	1·63	1·48	3·35	1·86	2·72	0·66
Toowoomba	1·63	3·15	1·43	2·36	4·75	1·01	2·90	2·87	2·00	4·67	1·69	2·47	1·35
Warwick	1·00	1·99	2·48	1·67	3·83	1·84	4·19	1·93	1·01	3·31	1·23	1·99	1·11
Westbrook	...	...	...	...	...	...	3·71	1·78	1·81	3·04	1·16	1·85	1·18

A. W. ANDERSON,
Acting Government Meteorologist.

QUEENSLAND PRODUCTS IN BRITISH MARKETS.

BUTTER.—The butter market is brisk, and colonial is selling well at 106s. to 108s. per cwt. Prices firm. Danish, 112s. to 114s. per cwt.; Dutch, 110s. to 112s.; Irish, 92s. to 112s.; Canadian, 104s. to 110s. The shipment of colonial butter by the "Australia" has arrived in good condition.

CHEESE.—Colonial (Canadian), 52s. to 53s. to 55s. per cwt.; New Zealand, 52s. to 54s. per cwt.

SUGAR.—Refined, £16 10s. to £18; syrups, £10 10s. to £11 10s. German beet, 88 per cent., 9s. 9d. per cwt.; first marks granulated, f.o.b. at Hamburg, 12s. 6d. Business quiet.

SYRUPS.—4s. 9d. to 14s. per cwt.

MOLASSES.—5s. to 7s. 6d. per cwt.

RICE.—Rangoon, 7s. $4\frac{1}{2}$d. per cwt.; white, good to fine, 13s. to 13s. 6d.; Japan, cleaned, 12s. 6d. to 13s. 6d.; Java, cleaned, 15s. to 17s.; Patna, 20s. to 24s.

COFFEE (duty paid).—Ceylon plantation, bold, 108s. 6d. to 116s. per cwt.; peaberry, 125s.; smalls, 70s.; Dumont Santos, bold, 58s.; peaberry, 67s. 6d.; pale, greenish, high-grown Jamaica realised 123s. per cwt.; Mocha, 112s.

ARROWROOT.—St. Vincent, low to good medium, $2\frac{1}{2}$d. to $4\frac{1}{2}$d.; Natal, fine, $6\frac{1}{2}$d. to $7\frac{1}{2}$d.; Bermuda, 1s. 9d. to 2s. per lb.

WHEAT.—The wheat markets are tending downward, and cargoes are slow of sale. Cargoes of Australian wheat afloat are quoted at 32s. per 496 lb., September shipments at 32s. 3d.; and parcels by steamer at 32s. The American visible supply of wheat is now estimated at 75,535,000 bushels, as compared with 76,071,000 bushels last week. Australian, 30s. to 31s. per quarter; American, 33s. to 33s. 6d.; New Zealand, 29s. to 31s.; Argentine, 28s. to 31s.; English, 32s. 6d. per quarter for $62\frac{1}{2}$ lb.; 33s. per quarter for $63\frac{1}{2}$ lb.

NEW ZEALAND OATS.—22s. to 26s. per 384 lb.

GINGER.—28s. 6d. to 29s. per cwt.

PEPPER.—Capsicums, 20s. to 90s.; chillies, 37s. to 44s.

TOBACCO.—Prices remain practically unchanged.

WINE.—Fair, red wine (Australian claret type) in bond, 2s. to 2s. 6d. per gallon; fine old quality, 4s. 6d. per gallon.

GREEN FRUIT.—Bananas, 12s. per bunch; pines, 3s. to 5s. each. Almeria coloured grapes, 3d. per lb.; oranges, Naples, 8s. to 11s. per 420. Lemons, 22s. to 25s. to 33s. per 420.

COTTON.—The fact that cotton supplies in Great Britain and elsewhere will be very short for some time to come is pretty certain to have some effect upon the wool market. The American cotton crop this season is 1,838,424 bales below what it was last year, and this is attributed to the devastation caused by the abnormally stormy weather which prevailed during the early stages of what at the beginning gave promise of being the largest crop ever grown in the United States.

EGGS.—French extra, 11s.; selected, 10s. Russian, 6s. 6d. to 7s. 3d. per 120. Average price, 8s. 6d. per 120.

HONEY.—Australian, not quoted. Nominal value, 24s. to 26s. per cwt.

LINSEED OIL.—£33 to £33 10s. per ton.

OLIVE OIL.—£33 to £36 10s. per tun; eating oil, £50; lucca, 4s. to 5s. per gallon.

SISAL HEMP.—£21 to £22 per ton.

RUBBER.—Soft fine, 3s. 11d. per lb.; Para, fine, 4s. $1\frac{1}{2}$d.; coarse, 2s. 3d. to 3s. 7d. per lb.; New Guinea, good ball, 3s. 4d. per lb.; Ceylon, from Para seed, 3s. 11d. per lb. The value of the last crop of rubber in the State of Para was, at £400 per ton, £11,000,000.

WOOL.—12th October: At the colonial wool auctions to-day competition was spirited, and the market for all classes of wool showed a better tone.

The following were the average prices realised for the various clips mentioned:—Murchison, $6\frac{1}{2}$d.; Kilcumin, $7\frac{1}{2}$d.; Mangwary, $7\frac{5}{8}$d.; Terrick, $7\frac{7}{8}$d.; Quamby, $8\frac{1}{8}$d.; Gunnee, $8\frac{7}{8}$d.; Wattle Range, $9\frac{1}{4}$d.

13th October: The total quantity of wool catalogued to date since the opening of the present series of sales is 47,650 bales, and the quantity sold 44,955.

At to-day's sales all classes of wool were in brisk demand, and prices were very firm. Continental buyers are eagerly competing with British purchasers for merino wools at the highest rates.

The following average prices were realised:—Light, 6d.; Peninsula, $6\frac{7}{8}$d.; Bengamildi, $8\frac{3}{8}$d.; Keilira, 9d.; Penola, 9d.; Pentland, 16[illegible]d.; Dunlop, 17d.

The Australian Estates and Mortgage Company have received the following cablegram from their London house, namely:—"Firmer and more regular market all round, prices being about equal to opening sales."

Messrs. Dalgety and Co. advise having received the following cable from their London house, under date of the 10th instant:—"Wool sales continue without any change."

Frozen Meat.—The following are the latest quotations (13th October) for the various description of frozen meat mentioned (last week's prices being also given for comparison):—

New Zealand Mutton.

(Crossbred Wethers and Maiden Ewes.)

	Oct. 6.	Oct. 13.
Canterbury	4d.	$4\frac{1}{8}$d.
Dunedin and Southland	$3\frac{3}{4}$d.	$3\frac{7}{8}$d.
North Island	$3\frac{3}{8}$d.	$3\frac{3}{4}$d.

Australian Mutton.

(Crossbred and Merino Wethers.)

Heavy (over 50 lb.)	3 5/16d.	$3\frac{1}{2}$d.
Light (under 50 lb)	$3\frac{1}{4}$d.	$3\frac{1}{2}$d.

River Plate Mutton.

(Crossbred and Merino Wethers.)

Heavy	$3\frac{1}{4}$d.	$3\frac{1}{2}$d.
Light	$3\frac{1}{4}$d.	$3\frac{1}{2}$d.

New Zealand Lambs.

Prime Canterbury (32 lb. to 42 lb.)	$4\frac{5}{8}$d.	$4\frac{3}{4}$d.
Fair average	$4\frac{3}{8}$d.	$4\frac{1}{2}$d.

New Zealand Frozen Beef.

(Fair Average Quality.)

Ox, fores (100 lb. to 200 lb.) ...	$3\frac{3}{8}$d.	$3\frac{3}{8}$d.
Ox, hinds (180 lb. to 200 lb.) ...	$4\frac{3}{8}$d.	$4\frac{3}{8}$d.

Australian Frozen Beef.

(Fair Average Quality.)

Ox, fores (160 lb. to 200 lb.) ...	$3\frac{1}{4}$d.	3 3/16d.
Ox, hinds (160 lb. to 200 lb.) ...	$3\frac{7}{8}$d.	$3\frac{7}{8}$d.

The above prices are the official quotations furnished by the Frozen Meat Trade Association. The basis of quotations is sales of lines of not less than 100 carcasses of mutton or lamb, or 25 quarters of beef. All the quotations for mutton are for average quality. Quotations for New Zealand and Australian lambs do not include sales of small lambs or heavies or inferior quality.

Bacon.—Irish, 56s. to 72s. per cwt.; Danish, 50s. to 72s.; Canadian, 56s. to 64s.

Hams.—Irish, 68s. to 102s. per cwt.; American, 50s. to 56s.

Hides.—The trade quiet for some weeks. Queensland salted difficult to move. An offer of $4\frac{1}{8}$d., c.i.f., for Sydney butchers' hides met with no response. Sales: Queensland Meat Company, light, 5d. to $5\frac{1}{4}$d.; cow, 5d. per lb.; Queensland butchers', first light, $4\frac{7}{8}$d.; first cow, $4\frac{1}{2}$d.; second, $4\frac{1}{8}$d.; Sydney, first light, $4\frac{1}{2}$d.; second heavy, $4\frac{1}{4}$d.; first cow, $4\frac{3}{8}$d. Large arrivals from India have unsettled the market, and this will continue for eight or nine months more, so that lower prices may be expected.

Sheepskins.—New South Wales merino full-woolled, $6\frac{1}{4}$d. to $7\frac{1}{2}$d.; crossbred, full-woolled, $5\frac{3}{4}$d. to 6d. per lb.

New Zealand Hemp.—£20 to £21 per ton.

Tallow.—Mutton: Good, 27s. 3d. to 27s. 9d; fair, 26s. 9d. to 27s. 3d.; dull, 26s. 3d. to 26s. 9d. Beef: Good, 26s. 6d. to 27s. 3d.; fair, 26s. to 26s. 6d.; dull, 25s. 3d. to 25s. 9d.

General Notes.

RIFLE CLUBS IN QUEENSLAND.

Although the subject of the establishment of rifle clubs cannot be strictly defined as pertaining to agriculture, yet some sort of common link connects the farmer and the rural population generally with the rifle as a weapon, not merely for the destruction of the kangaroo and dingo, but for national defence. Our best soldiers in South Africa have been largely recruited, or perhaps we should rather say have eagerly volunteered, for war service from the farming districts, and it is in these same districts that the spirit of patriotism shines forth in the desire to form, in some cases, corps of mounted infantry, in others rifle clubs. Much disappointment has been felt amongst the young men in the country districts all over the colony in consequence of the non-acceptance of their offers of service in either of those capacities. With the example of the Boer farmers before them, who are all ready and willing, and not only ready and willing to turn out to fight for their country, but are ordered—commandeered—irrespective of age, to go to the front, what more natural than that our hardy healthy farmers and bushmen generally should be anxious to enrol themselves either as Defence Force men or as riflemen, to be ready at the country's call to turn out in its defence with a proper training in the use of weapons? That this spirit is thoroughly appreciated by the Commandant and the military authorities admits of no doubt; but there stands a lion in the path, represented by £ s. d., and this obstacle can only be overcome by patience. We should like to see every man between the ages of eighteen and sixty in possession of a good horse—two for preference—a good rifle, plenty of ammunition, and thoroughly skilled in riding and shooting. With these qualifications, and a thorough knowledge of the country and of bush craft, they would form a bulwark against any possible foreign invasion, which might give as much trouble to the invaders as the Boers have given to our forces in the Transvaal and Orange River Colony during the past twelve months.

But, as before said, financial reasons compel the military authorities to decline many offers of service. We have made inquiries on the subject in the proper quarter, and have received the subjoined explanation from the Military Commandant, Colonel Harry Finn, through the Acting Infantry Staff Officer, Lieutenant-Colonel J. F. Flewell-Smith :—

"It is understood that a feeling of discontent exists among a few owing to the non-acceptance of certain applications to form rifle clubs. This is to be regretted, as pointing to an unmerited want of confidence in those who are responsible for the defence of the colony. Thanks to the patriotism developed by the South African war, applications to form new companies of all arms and for new rifle clubs have poured in from all parts of the colony, and are still being received.

"For financial reasons, it is possible to accept only a proportion of these offers; the selection of the new units and clubs to be formed calls for very careful consideration. The defence of this colony is not to be treated lightly; far from that, it is a question of deepest concern, and those upon whose shoulders the responsibility rests recognise the importance of obtaining the best possible results for the money allotted for the purpose. Rifle clubs are being largely considered in this connection, and those bodies whose applications to form new clubs or to expand existing clubs have not at present been accepted may rest assured that their applications have been declined only after much thought, and that the negative reply has been given with great regret.

"The importance of rifle shooting is fully appreciated, and every endeavour is being made to provide rifles, ammunition, and range accommodation to meet requirements; but every thinking man will recognise the impossibility of getting these three necessary factors for shooting by simply wishing for them. Rifles cannot be readily obtained in large numbers; our requisitions are being complied with as rapidly as the public and private manufactories can turn them out—ammunition similarly. The provision of range accommodation is being pushed forward with all possible speed; and last, and by no means least, the Government has been asked to provide as much money as practicable.

"After lengthened waiting for a reply to an application, 'declined with thanks' is, without doubt, most unacceptable and possibly disheartening, but the Commandant asks all those who do not receive the reply they wish to believe that nothing is left undone to afford them what they seek, and that the denial has been based on the highest grounds—namely, the interests of the colony."

MUMMY WHEAT AND PEAS.

In confirmation of what we wrote a little while ago on Mummy Wheat and Peas, we now learn from *Farm and Dairy* that a resident of the Macleay River district, Mr. Laurie, when in England some years since was given, by the Curator of the Colchester Museum, some two or three grey peas, said by that gentleman to have been taken direct out of an Egyptian mummy's head. When Mr. Laurie returned to New South Wales he planted those peas, and they grew and flourished well.

He gave about a dozen to Mr. E. R. Crawford, of Young, New South Wales, who planted them, and they all grew. The latter gentleman says of them: "I obtained a lot of seed from them, and have since given a number away to various friends. The pea resembles our common grey field pea. The plant has a thick, broad, pithy stem, whilst the flower is rather pretty, much like a garden sweet pea. Under separate cover I have much pleasure in forwarding you a few seeds, thinking you might like to cultivate them. I call them the 'Mummy Pea.'"

TOMATOES IN ENGLAND.

The value of the export trade in tomatoes to England from foreign countries may be estimated by the fact that during the last six months 16,389 tons of tomatoes, valued at £331,302, were imported into that country.

GUESSING THE DEAD WEIGHT OF LIVE STOCK.

The competitions which have been held at some of our city and country shows for guessing the weight of a bullock, when dressed, only go to show that it is, in nearly all cases, mere haphazard guesswork. Those who have to deal with the slaughtering and weighing of stock know that, with slight variations, owing to extreme medium or low degree of fatness, the butcher's carcass is represented by 60 per cent. of the live weight of a bullock, 58 per cent. of that of the sheep, and 83 per cent. of that of the pig. If, then, the live weight of a beast is known, the weight of the dressed carcass can be arrived at with absolute certainty.

But how is the live weight to be ascertained? By measurement and calculation. Usually, the fat bullocks seen in the showyard are very quiet, and will allow themselves to be measured.

First take the girth in inches back of the shoulders, next the length, also in inches, from the square of the buttock to a point even with the point of the shoulder-blade. Then multiply the length by the girth, and divide by 144, to get at the square feet on the animal's surface.

Multiply the result by the number of pounds per foot for cattle of different girths. The product will be the number of pounds of meat in the four quarters of the animal.

For cattle of a girth of from 5 to 7 feet reckon 23 lb. to each superficial foot; and 31 lb. for a girth of from 7 to 9 feet. For small cattle and calves of a girth of from 3 to 5 feet, allow 16 lb. to the foot; and for sheep, pigs, and all animals measuring less than 3 feet, 11 lb. must be allowed per foot.

Example.

Suppose we have an animal whose girth is 6 feet 4 inches (76 inches), and length 5 feet 3 inches (63 inches). By the rule:—76 × 63 = 4,788; 4,788 ÷ 144 = 32·25 superficial feet; 32·25 × 23 = 764·75 lb., or $54\frac{4}{7}$ stones.

From this, if the animal be only half-fattened, *deduct* 14 lb. in every 280 lb., or 1 stone in 20 stone. If very fat *add* 1 stone to every 20 stone.

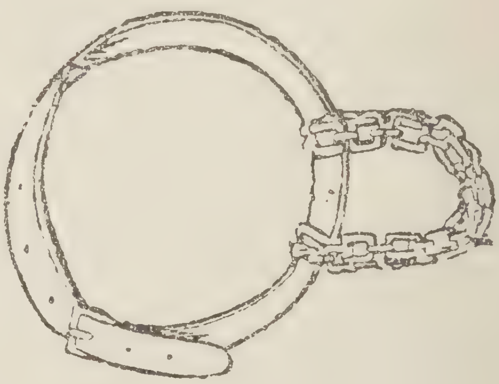
ANOTHER WAY.

Take the measurement of the girth where it is smallest (close behind the shoulder). Take the length from the front of the shoulder to the insertion of the tail. Reduce to inches, and multiply the *square of the girth* by the length. Finally, multiply the product by ·24, ·26, ·28, or ·30, according to the fatness of the animal.

Roughly, the weight of the carcass is to the weight of the live animal as 1 to 2 (a little more in cattle), as about 4 to 7 in sheep, and 2 to 3 in pigs, the proportion slightly varying according to the condition and breed of the animals.

TO PREVENT SHEEP DOGS BITING.

Mr. A. C. Nairn, Port Charles, New Zealand, writes:—"Herewith is a rough sketch of a device to be used on a dog which is in the habit of biting sheep while driving. The originality of this device and its practical use must be credited to Mr. Matthew Ward, of Colville Grange, Cabbage Bay. The device, as used by Mr. Ward, is simply a piece of dog chain about 1 foot long, doubled (though a single piece would, no doubt, be quite as effective). The end of the



dog's collar is passed through the free links at the end of the chain, then through the bight, thus looping the chain on the the collar as in Fig. 2. When adjusting the device, place the loop of the chain in the dog's mouth, and buckle the collar tightly round the neck. The dog is quite unable to free himself from the chain bit, which, while allowing free respiration, will not allow him to close his jaws sufficiently to bite a sheep, and precludes his picking up a poisoned bait or drinking poisoned water. Fig. 2 shows the device, and Fig. 1 shows how it is adjusted."

NOVEL TELEPHONE SYSTEM.

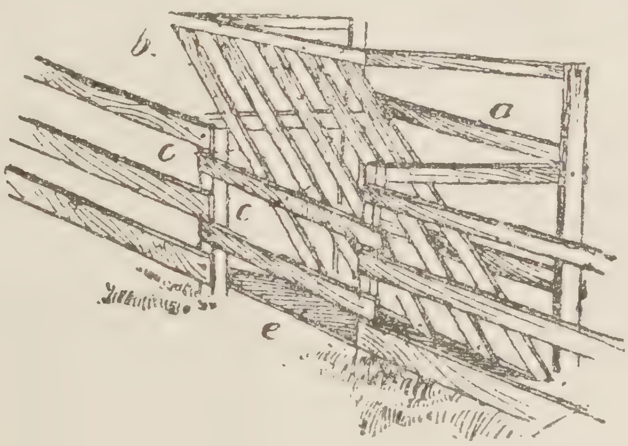
A cheap and novel telephone system is in every-day use among the farmers in Indiana. The top wire of a barbed-wire fence is given a good coat of india-rubber paint, and is used as the conductor. Where roads or railways are crossed an ordinary galvanised wire is laid in an inverted trough underground, or raised up on poles. The line is many miles long.—*Engineer.*

EGGS FROM CHINA.

It is not so long since a great scare arose in a southern colony over the large imports of eggs from China, as it was thought that the Chinese would pour eggs into Australian markets in such quantities that the local poultry-farmer would be ruined. No such dire catastrophe, however, has happened. The eggs which arrived in two steamers would appear to have been the first and last shipment from the Flowery Land. The fact is that European firms in that country can utilise almost as many eggs as the people can produce, in the manufacture of albumen from the white of the egg for photographers' use, the yolk being employed by tanners, so that the Australian industry appears to be in no danger of extinction.

A RACK FOR FEEDING CORN FODDER.

Feeding unshredded corn fodder is hard work, on account of the difficulty of handling. There is also a greater part of the stalks that the cattle will not eat. This accumulating under the cattle's feet or about the feed lot soon becomes a nuisance. Accompanying this description I send the sketch of a rack that will be easy to fill and which will retain the stalks, allowing the cattle to strip off the leaves, corn, and tender eatable portions. The uneaten portion can be cleansed out before filling anew, and the useless stalks piled up for hauling away or mixed with the accumulating manure heap, where the refuse of barn and stable is piled before being hauled to the fields.

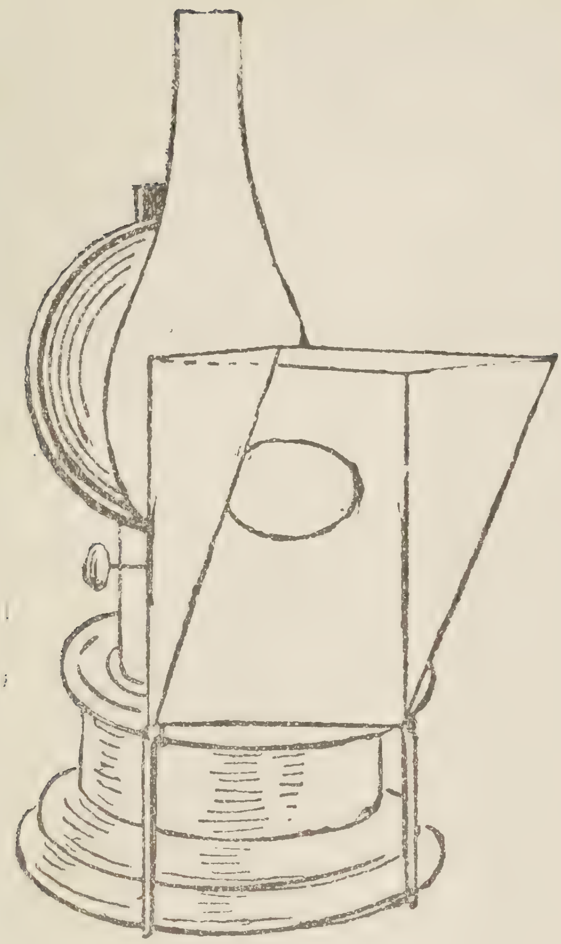


The rack is to be built against the fence, so that the filling can be done from the outside, the outside of the manger at A being only high enough to retain the fodder. The frame of the rack should be made of 2 by 4's. The rack, B, should be made of the 4-inch fencing lumber, the slats about 4 inches apart. The outside rack, C, should be set out far enough so that the cattle can easily reach down inside to pick up the chaff. To guard against any waste here, it is well to have the bottom, E, floored, and the floor surrounded by a 6-inch board. The rack can be made any length, according to the amount of stock to be fed.

RABBITS IN VICTORIA.

In 1867 a Mr. Robinson turned out on his run in the Warrnambool district of Victoria thirteen rabbits; by June, 1870, over 100,000 had been killed, and more than £7,000 had been spent in the endeavour to stamp them out; 2,400 were shot by a party in a single day.

In 1865 the writer turned out a dozen tame rabbits, which soon made burrows in the steep banks of Oxley Creek, at Sherwood. Within eighteen months not a rabbit was to be seen. Black and carpet snakes were then numerous in the district, and it is probable that the young rabbits were disposed of by these reptiles.—Ed. *Q.A J.*



LAMP EGG-TESTER.

The lamp egg-tester illustrated is of German manufacture, but it can be successfully imitated for home use. It consists of an ordinary lamp, with a metal reflector at one side, and on the opposite side a metal or pasteboard shield, with a shelf at the top to keep off light from above, and a small shelf about 3 inches below, with an aperture a little smaller than the average egg. Eggs placed at this aperture may be examined and tested with great certainty. Our illustration and description are taken from the *Australasian.*

EDUCATION.

Education is a companion which no misfortune can depress, no crime destroy, no enemy alienate, no despotism enslave. At home, a friend; abroad, an introduction; in solitude, a solace; and in society, an ornament. Without it, what is man? A splendid slave, a reasoning savage.—*Varle.*

THE CULTIVABLE AREA OF GREAT BRITAIN.

Twenty-three per cent. of the total area of England, 40 per cent. in Wales, and 75 per cent. in Scotland are now under wood, coppice, mountain, heath, water, &c. The remainder—*i.e.*, 32,777,513 acres, which are either under culture or under permanent pasture—may be taken as the "cultivable" area of Great Britain.

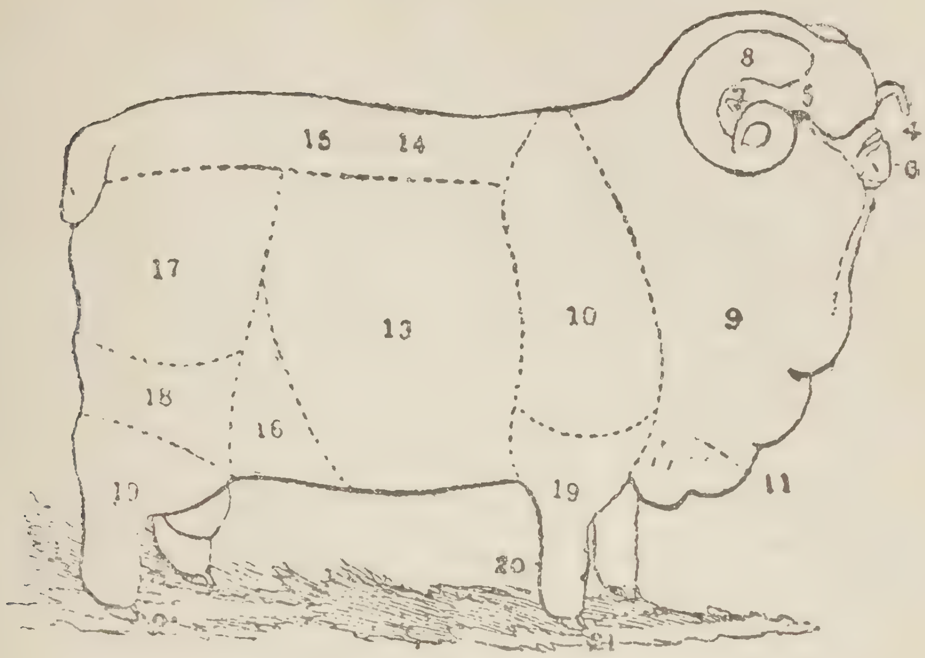
LIABILITIES OF BEEKEEPERS.

A case affecting the liability of beekeepers was dealt with at Basingstoke County Court (England), by Judge Gye. John Butter, a wood-dealer, sued the village postmaster, Mr. Longley, for the recovery of part of the value of an old mare which defendant's bees stung to death; also 10s. on account of pain from bee stings suffered by plaintiff; 10s. for loss of use of part of a field adjoining the postmaster's garden, where the plaintiff's labourers could not work owing to the bees; and 20s. for extra labour through having to make a hayrick in another position. It was suggested on the defendant's behalf that some other person's bees were at fault, but the plaintiff and his witnesses established to his honour's satisfaction the fact that the bees came from the defendant's hives. Judge Gye, in giving judgment for the amount claimed, said that a beekeeper kept bees at his own risk, and if they did damage he was liable.—*Exchange.*

RECIPE FOR WORMS IN HORSES.

A correspondent at Geraldton asks for a recipe for worms in horses, especially tapeworms. Mr. W. C. Quinnell, M.R.C.V.S., recommends a dose of 2 oz. of turpentine given in a pint of linseed oil, which will effect a temporary clearance.

POINTS OF MERINO RAM.



4. Countenance.—The forehead should be broad and the countenance healthful.
5. The Eyes should be bright and placid, and free from spots.
6. The Muzzle.—The muzzle should be clean, the nostril expanded, and the nose white, wrinkly, and covered with short, furry, soft, velvety hair.
7. The Ears should be white, soft, thick, wide apart, and partly covered with wool.
8. The Horns should not be too close to the head and neck, nor standing out too widely, and free from black or dark streaks.
9. The Neck should be short on the top, deep when viewed from the side and long below, strongly set to the head and shoulders, towards which it should be becoming deeper.
10. The Shoulders should be broad and massive as to depth and breadth, very little, if any, above the level of the back, and well placed.
11. The Chest should be wide and deep.
12. The Skin should be thick, soft, and pink.
13. The Barrel should be round and lengthy.
14. The Back should be short, level, strong, and straight.
15. The Loin should be broad and strong.
16. The Flank should be deep and straight.
17. The Quarters should be long and well filled up.
18. The Thighs should be long and broad.
19. The Legs.—The fore legs should be short, straight, and well apart, and the hind legs should be set so as to give the hind parts a perpendicular appearance, while the bone should be heavy, but of fine texture.
20. The Muscle should be fine and firm.
21. The Hoofs should be clear in colour and well shaped.—*Journal of Agriculture of Western Australia.*

ANIMAL MANURE.

From a series of careful experiments which have been made from time to time, it has been shown that a well-fed horse produces from 5 to 6 tons of manure per annum during the time he is in the stable. A steer of 1,000 lb. produces about 20 tons of manure a year. A sheep weighing 60 lb. would produce about three-fourths of a ton, and a pig from 2 to 3 tons of manure yearly. These amounts include the necessary bedding to keep the animals comfortable.

GERMINATING OLIVE SEEDS.

The olive tree is, as a rule, propagated by means of truncheons, or cuttings, or from the tips of the branches, but it may also be grown from the seed, the latter being first cracked and well washed. Experiments have lately been made in Italy to determine the effect of different temperatures of water on the germination of the seeds. After removing the pericarp from a number of olives the seeds of eight lots were subjected for ten minutes to the action of water of different temperatures, the initial temperature of which varied from 30 to 100 degrees C. The seeds were then planted, and the germinations for seven months were tabulated. It appears that the germination of the olive seeds was accelerated when they were treated with water heated to from 40 to 50 degrees, and the maximum was reached at 70 degrees C. When the water was hotter than 90 degrees C. there was no germination, the seed having been killed.

AGRICULTURAL AND HORTICULTURAL SHOWS.

The Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may be decided on.

Agricultural Patents.

In an excellent article by W. C. Dodge, in *Cassier's Magazine* (London), on "Invention as a Factor of American National Wealth," and the benefits of the United States patent system, the writer shows what it is that has increased America's productive capacity, the part that the patent system of the country and its resulting inventions have had in that increase, and that, in future, dependence must, more than ever, be placed upon inventions for ability to compete for the trade of the world. It was the inventor of the cotton gin who created both personal and national wealth. The American corn crop amounts to over 2,000,000,000 bushels per annum. Were it not for corn planting and cultivating machinery what would the corn crop amount to? And, without the corn, where would be the pork and beef, either for use or export, and of which America exported 193,500,000 dollars' worth in 1899? The wheat crop in 1898 amounted to 675,000,000 bushels, with an average export of 120,000,000 bushels per annum. Suppose we were to strike out of existence the dozen or more leading inventions used in the preparation of the soil, the seeding, harvesting, threshing, storing, and transporting of the crop, what then? Not a bushel could be exported, because, by hand, it could not be produced. By the adoption of improved implements, the cost of raising wheat in America has been reduced to 4·50 dollars or 5 dollars (£1) per acre, and that of harvesting to half-a-cent a bushel. All great writers agree that invention is not only one of the noblest avocations, but it is one of the greatest factors in the increase of national wealth. In making these remarks, we wish to draw our readers' attention to the great value of the Patents Office to agriculturists and others who often are struck by some new idea by which rural work might be improved, hastened, or simplified, but who do not take the trouble to secure the profit of their invention, either because they think someone else has already grasped the idea, or because of the supposed great expense to be incurred by obtaining patent rights. The first objection may be easily disposed of by the fact that on payment of 1s. at the Government Patents Office the register of all patents may be inspected for a quarter of

an hour. The fee on filing an application for a patent with provisional specification is £1; on filing complete specification, £2. Before the expiration of four years a renewal certificate may be obtained for £5, or yearly fees may be paid on the fourth year of the date of the patent of £1; fifth year, £1; sixth, seventh, eighth, ninth, tenth, and eleventh years £1 10s. for each year, and £2 each year for the twelfth and thirteenth years. If an invention is worth anything, it is surely worth these small fees. We need only mention the fact that Australian patentees have been enriched by taking advantage of the patent laws, and at the present moment an Australian has patented an improvement in the Martini rifle of such a nature that it has been approved after trial by the British military authorities, and in all likelihood the British troops will be supplied with a rifle improved by an Australian patentee. In agricultural implements, we may remind our readers of the cane-planting and maize-cutting machines invented by Queensland mechanicians, and of various devices constantly mentioned and depicted in Australian journals calculated to simplify agricultural operations; and we would impress upon the farmers of Queensland that as the American farmers have done good work in patenting inventions, in themselves apparently simple, yet productive of great results, so the Queensland farmers, who are no whit behind their American *confrères* in intelligence and inventive genius, have it in their power to do good work for the colony, and to reap substantial benefit for themselves by promptly securing themselves against any infringement of their inventions by application to the Patents Office.

In future we shall devote space to recording all patented inventions having reference to agricultural operations, and as a commencement we print seven of these furnished to us by the Patents Office.

PATENTS.

The undermentioned applications for the grant of letters patent have been accepted, and are now open to public inspection at the Patents Office:—

Stripping and Harvesting Machine.—Application No. 5485: Walter Charles Barton, of Meadowbank, near Sydney, New South Wales, engineer. "Improvements in Stripping and Harvesting Machines and such like Agricultural Implements." Dated 12th May, 1900. (Drawings, 40s.; specification, 15s.) Contains improvements in adjusting the height of cutting; in renewing a bearing, and in transmitting motion by belts or gear chains.

Felloe Expander for Cart-wheels.—Application No. 5488: Frederick Blakoe, of Tunney street, Charters Towers, Queensland, engineer. "A New or Improved Felloe Expander." Dated 17th May, 1900. (Drawings, 5s.; specification, 3s. 6d.) A metal wedge with bearing plates is inserted between the wooden felloes with a radial draw bolt and nut inside. Also, the ordinary bolts which attach the tire have the holes in the tire elongated, to allow of movement between felloes and tire when the wedge alters their relative positions.

Closing Felloes or Rims of Cart-wheels.—Application No. 5494: Henry Caspers, of Dean street, Albury, New South Wales, mechanic. "An Improved Wheel for Road Vehicles." Dated 19th May, 1900. (Drawings, 12s. 6d.; specification, 7s.) The ends of the tire are not welded, but bent between the ends of a pair of felloes, and secured to clamps which are drawn together by circumferential screws. The adjustment gap is filled with compressed leather. Particulars of the construction and attachment of the clamps and screws are described.

Three-rope Drag Scoop.—Application No. 5495: George Henry Dunlop, of No. 60 Queen street, Melbourne, Victoria, civil engineer. "Improved Method and Machinery for Excavating, Dredging, and Transporting Earth and other Materials." Dated 19th May, 1900. (Drawings, 15s.; specifications, 31s. 6d.) Drag scoops of special form are operated from two hauling stations

by one out-haul rope and two tipping and in-haul ropes. Details of pulleys, &c., at power stations, for operation by any usual hauling engine, are described. The scoops may run on sledges or wheels, and may have extended lever projections to facilitate tipping.

Tires and Felloes, Mud-guards for Implement Wheels.—Application No. 5500: Joseph Burt Messent, of No. 7 Barrack street, Sydney, New South Wales, engineer. "Improvements relating to the Tires and Felloes of Wheels." Dated 22nd May, 1900. (Drawings, 5s.; specification, 4s. 6d.) In specification 4881, mud-guards of wood are described for preventing the lodgment of sticky soil between the spokes of implement wheels. The mud-guards are now made of moulded sections in thin sheet metal, bolted or locked against rim and spokes.

Two-rope Silt-scoop.—Application No. 5571: Peter Waite, of 27 Currie street, Adelaide, South Australia, station-owner. "Improvements in Earth Scoops." Dated 9th July, 1900. (Drawings, 7s. 6d.; specification, 9s. 6d.) Arranged to minimise the stirring of soft silt. The scoop has two quadrantal pivoted parts meeting at bottom and carried on a sledge frame with side plates. The back quadrants are normally down, and may be raised, lowered, or locked by chain and lever; the front quadrant is coupled to both drag ropes, so as to be opened in forward motion and closed on the return.

Cribwork for Overshot Weirs.—Application No. 5591: Frank Cotton, of 163 Denison road, Lewisham, in the colony of New South Wales, gentleman. "Improvements in the Construction of Cribs for Weirs and Dams." Dated 28th July, 1900. (Drawings, 5s.; specification, 4s. 6d.) The timbers are arranged to allow settlement without serious displacement of the puddle or packing, and the timbers are connected by headless spikes to facilitate settlement without splitting the attachments.

The Markets.

AVERAGE TOP PRICES FOR SEPTEMBER.

Article.		SEPTEMBER. Top Prices. £ s. d.
Bacon	lb.	0 0 7
Bran	ton	5 15 0
Butter, First	lb.	0 0 11¼
Butter, Second	,,	0 0 7⅝
Chaff, Mixed	ton	3 10 0
Chaff, Oaten	,,	4 8 9
Chaff, Lucerne	,,	3 12 6
Chaff, Wheaten	,,	2 10 0
Cheese	lb.	0 0 7
Flour	ton	8 7 6
Hay, Oaten	,,	3 15 0
Hay, Lucerne	,,	2 5 0
Honey	lb.	0 0 1⅝
Rice, Japan (Bond)	ton	16 3 9
Maize	bush.	0 3 3¾
Oats	,,	0 3 4¾
Pollard	ton	5 11 10½
Potatoes	,,	4 7 6
Potatoes, Sweet	,,	1 16 3
Pumpkins	,,	1 12 6
Sugar, White	,,	16 10 0
Sugar, Yellow	,,	13 0 0
Sugar, Ration	,,	10 10 0
Wheat	bush.	0 3 5
Onions	cwt.	0 11 4½
Hams	lb.	0 0 9⅜
Eggs	doz.	0 0 7
Fowls	pair	0 4 6¾
Geese	,,	0 5 10½
Ducks, English	,,	0 4 6¾
Ducks, Muscovy	,,	0 5 4½
Turkeys, Hens	,,	0 7 9
Turkeys, Gobblers	,,	0 16 3

ENOGGERA SALES.

Article.	SEPTEMBER. Top Prices. £ s. d.
Bullocks	11 8 9
Cows	7 10 7½
Wethers, Merino	0 17 1½
Ewes, Merino	0 12 10
Wethers, C.B.	0 18 2¼
Ewes, C.B.	0 14 7
Lambs	0 13 10½
Baconers	1 9 2
Porkers	1 4 7½
Slips	0 6 9

Orchard Notes for November.

By ALBERT H. BENSON.

The earliest varieties of Summer fruits will be ready to market during November; and as this is the beginning of the season, I beg to call the special attention of every fruitgrower in the colony to the importance of gathering and destroying all fly-infested fruits now if he wants to save any crop at all, as the neglect to destroy the first crop of flies will result in the loss of the succeeding crops of fruit. It is impossible to over-estimate the importance of destroying the early crops of fruit flies, as if left alone they breed so rapidly that the fruit crop is soon infested and destroyed.

The best way of destroying the first crops of flies is to gather and boil all infected fruit; such fruit, when boiled, to be fed to pigs or other animals. Feeding the fruit without boiling will result in the escape of a number of the maggots, and is therefore undesirable, besides being contrary to the Regulations of the Diseases in Plants Act.

Every fruitgrower should make it his business to see that his orchard is kept free from this pest, and not only his own orchard, but that his neighbours keep their trees free as well. All useless trees, such as inferior seedling peaches, guavas, &c, growing by hedge or fence sides, should be destroyed, as the fruit is valueless, and only becomes a harbour and breeding-ground for the fly. Unless fruitgrowers take action—combined and systematic action—to deal with this pest, it will never be kept in check; and for such action to be effective it is best to destroy all trees that produce unsaleable fruit, and to concentrate one's energies in keeping such trees clean that produce fruit of such a quality that it will command a ready sale. The marketing of fruit is a matter also that requires much more care and attention than is usually bestowed upon it. In many instances really good fruit is completely spoilt by carelessness in gathering, handling, and marketing, and is consequently valueless; whereas had it been carefully gathered, properly graded for size and ripeness, and packed in such a manner that it will carry well without bruising, and when opened up show to best advantage, it would have realised a satisfactory price. First-class fruit always pays to be well handled and well packed, as for such fruit there is always a good demand; but for badly handled, undersized, and bruised fruit there is little if any demand—at any rate, at remunerative prices. First-class early peaches, such as the Alexander or Brigg's Red May, grown on the Downs, would pay to be carefully wrapped in tissue paper and packed in trays holding one layer of fruit, as, if marketed in such a manner, they could be placed on the Brisbane market in first-class condition, and would realise good prices. First-class apricots, such as the Moorpark, would also pay to be handled in the same manner. Fruitgrowers should bear in mind that the better condition in which they market their fruit, and the more attractively it is got up, the better the chance of its realising a satisfactory price.

During the month, the Orchard should be kept well cultivated, especially in districts where the rainfall is light; and in such districts, if water is available for irrigation, a good watering should be given to all fruit trees and vines. By a good watering I don't mean damping the surface, but giving the soil a thorough soaking, as one good watering is worth a dozen small ones. Attend to the summer pruning of all young trees, removing any superfluous branches and pinching back all strong growths. Attend to the cultivation of the nursery; stake all grafts or buds, so as to produce straight, well-grown trees, the bud or graft being topped at the height that it is wished to form the head of the future tree.

Farm and Garden Notes for December.

Farm.—In the midst of the general satisfaction expressed during the month of September at the excellent prospects of a good wheat harvest, a sudden damper was put on the hopes of the farmers in consequence of a severe frost during that month, and there was an apparently well-grounded fear that in some of the colder portions of the Downs wheat districts the disaster of 1899 would be repeated. Fortunately, on the crops being examined by the Agricultural Adviser, Mr. Peter McLean, these fears were allayed, as it was found that the crops, although somewhat frosted, would recover perfectly, and this recovery actually took place. Harvesting will now be general throughout the colony. The area under wheat exceeds that of 1899 by 6,308 acres; thus there will be 100,325 acres to harvest. If an average of between 14 and 15 bushels per acre all round is harvested, the total wheat crop should reach about 1½ million bushels. With regard to malting barley, we should not be surprised if the harvest returns reach over 200,000 bushels.

Barley should be allowed to ripen in the field before cutting, but to avoid scattering the crop should be harvested as soon as the grain is hard. As there is a probability of showery weather occurring during the month, great care should be exercised in stooking, as a shower of rain will discolour what is left on the ground. Stacking should only be done when the barley is absolutely dry, and it should be allowed to remain from six weeks to two months in the stack before being threshed.

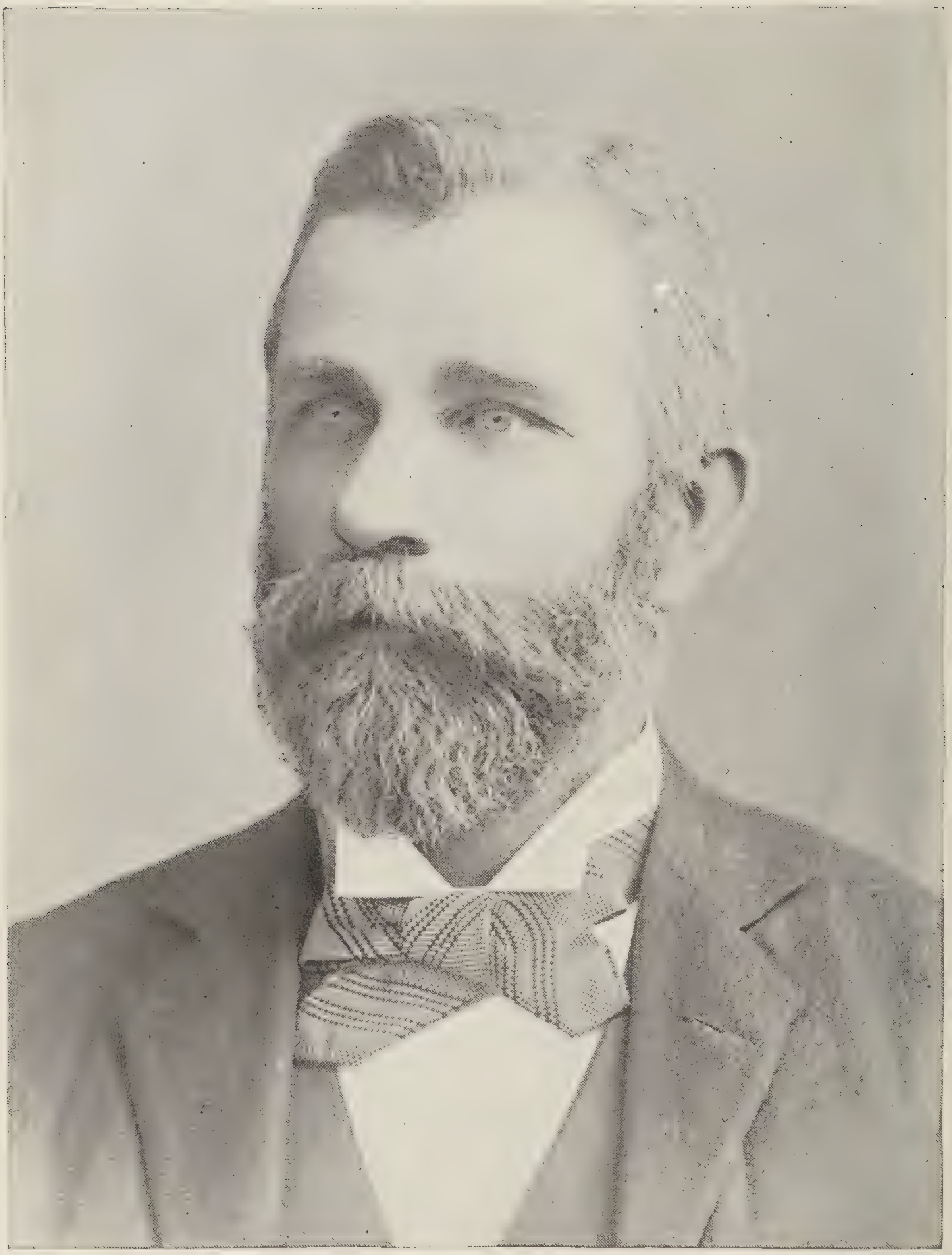
Maize may still be extensively sown, also sorghum, Kafir corn, imphee, and panicum. Arrowroot, ginger, and sweet potatoes may be planted. Keep all crops clean, and thin out all that are too closely planted.

When digging potatoes, too much care cannot be exercised in protecting the tubers from the sun. Dig them as soon as the skin is firm, because, if they are left in the ground too long during the great heat of this month they will rot. The best time to dig potatoes is in the early morning, before the sun has gained great power, when they should be carted to the barn and spread out to cool. Tobacco must be attended to in the manner described in our "Notes for November."

Kitchen Garden.—December is the most trying month for the market gardener, and much difficulty is usually experienced in keeping up a succession of vegetables. It is in such hot weather, as is the rule during this month, that the great value of mulching becomes apparent, and all crops liable to suffer from the effects of hot winds or drought should be protected by spreading a covering of mulch over the ground between the rows and around the plants. The soil is thus kept at an equable temperature, evaporation is largely checked, and the baking of the surface which usually occurs after watering is prevented. In heavy, stiff soils, this is a most important result. Should mulch not be available, keep the hoe and cultivator constantly going, which will preserve the soil in fine tilth, and so greatly prevent evaporation. French beans may still be sown in well-soaked soil. Cucumbers, melons, marrows, should receive copious waterings of liquid manure. As soon as cucumbers begin to ripen, the vitality and bearing power of the plants are much weakened; therefore, allow none to ripen except such as are wanted for seed. Seeds of all these vegetables may be sown for a succession. Tomatoes should be in full bearing, and the plants should be supported by stakes and trained to a single stem through wire-netting. By this means the fruit is kept clean and is easy to gather. Take up onions, spread them thinly in the barn till the tops are sufficiently withered to be easily pulled off, then grade

them into sizes and store in a cool place until sold. With an unlimited supply of water and good shade, lettuce and other salad plants may be grown, but it is too hot to expect good results, notwithstanding all the care bestowed on the plants.

Flower Garden.—The main work in the flower garden now is to care for the flowering plants and shrubs, by watering, stirring the soil, and removing all spent blooms—a process which materially lengthens the blooming season. Should any aphis or scale appear on the roses, spray them with kerosene emulsion. The spraying should not be done on very hot, dry days, but choose a comparatively cool morning and evening for the work. Chrysanthemums will now require to be staked and pinched. They should receive frequent waterings of weak liquid manure. Syringe them overhead every afternoon, just before sundown. Allow no suckers to grow until the plants have ceased flowering. Watch for caterpillars and aphis. Dahlias must be well staked up, and will be the better for occasional doses of liquid manure. Remove the dead leaves from bulbs which have finished flowering, and, when quite dried up, dig them up and store them in a dry, cool place. Keep the weeds well under command, as it stands to reason that the plants require all the moisture in the soil at this season, and cannot afford to be robbed of any portion of their nourishment by weeds. Look after the hedges, and keep them cut as they grow. A few annuals may still be planted—such as balsams, calendulas, cosmos, coreopsis, marigold, nasturtium, portulaca, zinnia, cockscomb, and celosia. Amaranthus may be sown in boxes, and any pricked off ready for planting may be planted out now. Narcissus should be lifted, and at once planted in new situations—not stored.



HONOURABLE ROBERT PHILP,

M.L.A. for Townsville,

Is a native of Scotland. A member of the extensive firm of Burns, Philp & Co., Limited. Came to the colony with his parents when ten years of age; went to the Normal School; and after being eleven years with the firm of Bright Bros. & Co., Brisbane, left for Townsville to join Mr. James Burns, who was then established in business. The firm of Burns, Philp & Co. have now branches in all the important towns in North Queensland; at Samarai and Port Moresby, New Guinea; Geraldton, Esperance Bay, and Perth, Western Australia, with head office, Sydney. Mr. Philp was first elected to Parliament in January, 1886, for the electorate of Musgrave; in 1888 was returned for Townsville, and still represents that electorate. Was appointed Minister for Mines in 1893, and Treasurer 1898. Resigned with Mr. Dickson's Ministry on 29th November, 1899; but on the resignation of Mr. Dawson's Ministry, Mr. Philp was called upon to take over the reins of government, and at present he occupies the respective offices of Premier, Treasurer, and Secretary for Mines.

Open Spaces for the People.

No. 2.

By PHILIP MAC MAHON,
Curator of the Brisbane Botanic Gardens.

In my last paper on this subject, published in the issue of the *Queensland Agricultural Journal* for October last, I referred to the pains which were taken, and the money expended by the other colonies, and by foreign States, to secure for the people the inestimable benefits of fresh air and rational recreation, and pointed out the deficiencies of our own otherwise favoured city in this respect.

The question naturally arises—What can be done to provide the evening promenade which I then outlined? In answering this question, so far as the provision of such a very desirable boon can be met by the Botanic Gardens, I think it will be admitted that certain provisos must be made before the matter can be even discussed. The principal of these are: (1) The beauty of the Gardens must be in no way defaced or damaged, but must, as far as possible, be enhanced. (2) There must be no opportunity for the display of any unseemly conduct more than would obtain under ordinary conditions in daytime. (3) The increased expenditure must be provided for. (4) Everything in the Gardens must be at least as secure from theft and injury as it is at present.

Can all this be secured at a cost which will not prove prohibitive? I think so.

About twenty years ago I had the sole management of the Botanic Gardens of a town having a population of more than twice that of Brisbane and suburbs, with other large towns within easy rail. On frequent occasions the public were admitted to those Gardens in the evening under proper precautions, and I never saw any cause to regret the fact. If the four conditions which I have indicated above can be secured, there is really no reason why a portion of the Gardens should not be open until such an hour in the evening as would enable their beauty, and their health-giving fresh air, to be enjoyed by every well-behaved person who might wish to enjoy them.

The plan attached to this paper shows how I would propose to secure this end. Thirteen and a-half acres next the river would be partitioned from the Gardens after sunset, brilliantly lighted with electric light, and would remain open until 11 p.m. on every night of the week, exclusive of Sundays. Seats would be provided, the paths would be improved, and, as the promenade so created would catch all the cool breeze from the river, it would, I have no doubt, under proper supervision, become a favourite place with citizens and visitors in the warm evenings, of which we have so many.

In about seven months from now the trams will run to the Gardens gates at the river end of Edward street, and the Gardens will thus be placed within easy and pleasant reach of every part of the suburbs. But this will also enable the electric light to be laid on at a cost which will not be prohibitive, as it would formerly have been. The question of good musical performances is one which would no doubt arise, but could be settled afterwards, and I have not

included it in my estimate of cost, which follows. In this estimate I have only taken into account things which are actually necessary to commence with. A good water supply, for instance, along the whole length of the Promenade, would be much to be desired, but this would not be absolutely essential at first.

ESTIMATE OF INITIAL COST.

	£	s.	d.
Forty-three electric lights (1,000 candle-power effective, 2,000 candle-power nominal) complete	600	0	0
Forty-four chains iron unclimbable railing fencing, 4 feet 6 inches high, with gates ...	350	0	0
Improvements to roads	350	0	0
Seats for 1,000 persons	200	0	0
	1,500	0	0

ESTIMATE OF ANNUAL COST.

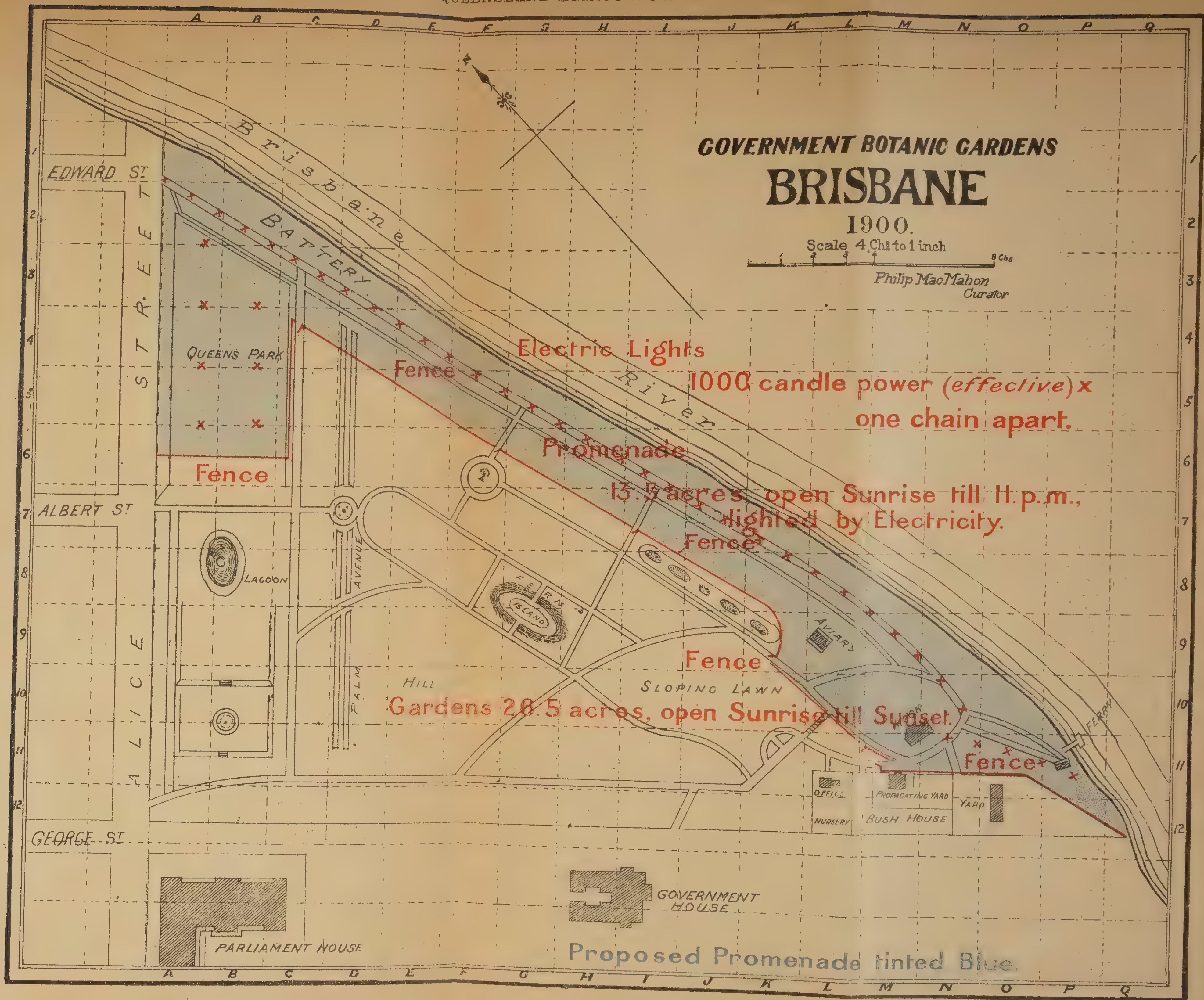
Electric current for six days weekly, exclusive of Sundays	130	0	0
Attendant for lamps, &c.	120	0	0
Two guards for evenings...	100	0	0
Repairs to roads, &c.	100	0	0
Interest on cost at 4 per cent.	60	0	0
Depreciation of plant, &c., 5 per cent. on cost	75	0	0
	585	0	0

When one considers the fact (not generally known) that the up-keep of the Brisbane Botanic Gardens only costs 33 per cent. per acre of the amount of the up-keep of any of the other State Botanic Gardens in Australia, and also that the large capital sums expended on the other gardens in the way of structures, water systems, &c., have never been expended here, it would not appear that this is a very large sum to pay for the above-mentioned work, assuming that there is any very general desire that the work should be carried out at all.

The position of the fence I have fixed chiefly in low ground, so that it would not interfere with the view of the river from the other part of the Gardens, or with the view of the Gardens from the Promenade. It would be masked by shrubs, &c., so as to be made picturesque, and deprived of the appearance of a boundary.

The Promenade and Gardens would, of course, have to be worked as a whole, as now, in the interests of good and economical management.

It is to be clearly understood that the above refers only to a promenade for the use of pedestrians, and does not contemplate any possibility of the site ever being used as a drive for carriages.


GOVERNMENT BOTANIC GARDENS
BRISBANE
1900.
Scale 4 Chs to 1 inch
Philip MacMahon
Curator
Brisbane River
BATTERY
EDWARD ST
ALBERT ST
GEORGE ST
ALICE STREET
QUEENS PARK
Fence
Electric Lights
1000 candle power (effective) x one chain apart.
Promenade
13.5 acres, open Sunrise till 11 p.m., lighted by Electricity.
LAGOON
AVENUE
PALM
FERN ISLAND
AVIARY
HILL
SLOPING LAWN
Gardens 26.5 acres, open Sunrise till Sunset.
FERRY
OFFICE
NURSERY
PROPAGATING YARD
BUSH HOUSE
YARD
GOVERNMENT HOUSE
PARLIAMENT HOUSE
Proposed Promenade tinted Blue.

Agriculture.

FIELD AND GARDEN REMINDERS FOR DECEMBER.

By HENRY A. TARDENT,
Manager of the Biggenden Experiment Farm.

By this time the harvest of wheats and barleys should be pretty well finished all over Queensland. On no account should the land be now allowed to remain idle, and to thus become a prey to all sorts of weeds. Wherever possible, it is an excellent plan to run first a mob of sheep on the stubble. They rapidly improve in condition on the young, fresh weeds which invariably grow after the removal of the wheat. They act also as excellent manure producing and distributing machines.

In many parts of France the people build their fowlhouses on wheels, and keep them moving from place to place on the field, thus allowing the hens to gather any stray grain fallen from the ears. Instead of being wasted as they are now with us, those grains are being turned into eggs and chickens, which are sold to the English, who pay for them over fourteen millions of sterling money annually. In farming it is the little drops which form the large streams.

As soon as possible the stubble lands should be ploughed, well pulverised, and sown with cow peas in rows, say, 3 feet apart and from 12 to 18 inches apart in the row. When sown thus, about 8 lb. will be sufficient for an acre.

This catch crop, which does very well at this time of the year, will bring in probably more money than the wheat itself. It will keep up an abundant supply of excellent chaff greatly relished by all farm animals. And last, but not least, it will keep the ground thoroughly clean and friable, and enrich it with nitrogen. No doubt some potash, phosphoric acid, and other elements will be removed with the crop. But this is scarcely remarked on the subsequent crop. The cow pea has a vigorous system of roots. They extend wide and deep in search of food. They bring their many important mineral matters towards the surface that is within the reach of the roots of the following wheat crops.

In most parts of Southern Queensland maize may yet be sown up to to Christmas—in some places even a little—very little—later. Not seldom the so-called late crop is the best, as it receives the abundant moisture of the rainy season. Maize should never be too crowded, especially if it is of the horse-tooth and vigorously growing varieties. A deep ploughing, thorough cultivation, and plenty of air and sunshine are the main conditions of a profitable well-grown crop.

In many places the spring crop of maize will be ready for harvesting. Wherever circumstances will permit, we should try and save the stalks for winter feed. For that purpose, when the bottom of the stalks begins to get yellow and the grain pretty solid, the stalks should be cut by means of an Osbourne Columbia corn-harvester, which delivers the stalks in bound and tied sheaves. In the absence of this machine, they can be cut down by means of the very simple and inexpensive corn-cutter described in this *Journal* (Vol. II., p. 348), which only cuts and lays down the stalks without tying them in bundles.

The stalks should be then stooked in the field for a few days, then carted to the barn or stack. When cut into chaff and mixed either with lucerne or wheat, oats, pumpkins, sweet potatoes, &c., they will come handy to feed all farm animals and keep them in condition during the winter months.

If we would make maize-growing really profitable, and give it the development it is entitled to in the colony, we should absolutely provide in every district a few husking, shelling, grading, and bagging machines. They are now not very expensive, and can be provided either by individual effort and enterprise or by a few farmers co-operating. In that way it takes only a few days to go through the work of preparing the crop for the market, instead of the months and months of weary and tedious toil it takes now with our imperfect means.

As to dairymen, they should always grow some maize for feeding green and for turning into ensilage, as in that way every particle of the crop is made use of and turned into profit. For that purpose, the best time to cut the stalks is when the grains are in the milky stage. Excellent results are also obtained from cow peas, millets, and nearly all sorts of sorghums—such as the Planter's Friend, Imphee, Amber Cane, Undendibule (Early Amber Cane), &c.

Attention has repeatedly been drawn in the *Journal* to the fact that young, green sorghums are sometimes fatal to horses and cattle. A good plan is to give first a feed of dry fodder; also to have the sorghums cut and slightly withered before feeding to stock.

Sowings can yet be made of pumpkins, marrows, squashes, cucumbers, rock and water melons. Sow also a few cattle-melons. Their feeding value is not great; but they give enormous crops, and keep well throughout the winter. When sliced or pulped, they are greatly relished by cattle and pigs. They should be fed mixed with chaff, or, still better, with bran. They keep the stomach free, and thus improve every fodder to which they are added.

Tomatoes and egg plants can still be sown and transplanted should the weather be favourable. When transplanting them it is always advisable to protect the young plants for a few days from the heat of the sun. When you have varieties which are worth multiplying, they will grow very well from cuttings, made a foot long and planted deep, with only a few leaves left at the end.

It is now too late for cabbages, cauliflowers, peas, and French beans; but Lima beans can still be planted.

Sweet potatoes can be planted up to Christmas, although those planted early give usually better results.

Above all, keep the land clean and well pulverised. No land is rich enough to produce at the same time paying crops and weeds.

AGRICULTURAL SOCIETIES, AND A POSSIBLE EXTENSION OF THEIR USEFULNESS.

By HENRY A. TARDENT,
Manager of the Biggenden Experimental Farm.

No group of men has done more for the material and social development of the colony than the members of agricultural societies. As a rule, we are clannish in these colonies. There are Irish, English, Scotch, and Natives' societies. We group ourselves according to our religious creeds or political opinions; also for certain special pursuits and amusements. All those societies are no doubt useful. They are always a healthy sign in a free country. They are an indubitable evidence of the pulsation of life throughout the body politic. Still they are fractional and sectional.

The agricultural societies alone embrace the whole population of a district. In them the individual efforts of a whole region are centralised and focussed, with a view to ensure the success of our fairs or annual shows, for up to the present the work of those societies has consisted chiefly in getting up local shows, in a few instances only in preparing district exhibits for the Queensland National Association's Exhibition.

Personally, I must admit that I like these annual shows, which occupy in our national life a place similar to that once occupied by the Olympic games in the life of the ancient Greeks. Once in a year they bring together the population of a whole district, and get them to work to a man for a common purpose. We meet there old friends and acquaintances, and refresh our minds and hearts in their congenial company.

It is also at such times that we can appreciate the real value of the year's work. If we are amongst the prize-winners we feel justly proud, and promise ourselves to make new efforts to maintain our position. Should we be beaten, the failure acts upon us like a whip on a dreamy horse. We lift our head, quicken the pace, and determine that we will show next year that there is life in the old horse yet; that we are not going to give it best until we have tried and tried over and over again. A well-organised show is a sort of thermometer, showing unmistakably the relative prosperity of a given district, to which it bears the same relation as stocktaking to a trading firm. To these shows are due the improvement in the breeds of horses and cattle; the introduction of better types of hogs and poultry; the more extensive use of labour-saving implements; the production of higher classes of all sorts of crops and products.

The local tradesmen are not behind either. They show what they can do in various lines, and not seldom hold their own for both prices and workmanship against machinery and implements imported from Europe and America. The ladies, as it behoves, are to the front not only with fine arts and marvels of sewing and fancy work, but also with appetising displays of well-baked bread and scones, with all sorts of jams, jellies, and other dainties. Even the school children contribute to the success of the show with their neat maps and copybooks, to which the more skilful girls add their usually high-class sewing and samplers.

Another pleasant and characteristic feature of these annual shows is that the highest officials in the colony, such as His Excellency the Governor, Ministers of the Crown, and members of Parliament honour them with their presence. There they meet the stockbreeders, farmers, fruitgrowers, manufacturers, and others on neutral ground, and keep in touch with them. This exercises an excellent moral effect on all classes of the community. A show day is a busy day, and the committee and judges have a great deal of work to get through in a very short time.

A very objectionable feature of our shows is the great number of spielers and gamblers of all sorts who are allowed to pollute the ground with their presence. Gambling and farming have nothing in common. A gambler is a parasite on society; a man who makes money without having worked for it. The farmer is the very reverse. He earns his bread by the sweat of his brow, and rightly considers moneys acquired in any other way as stolen. A gambler loses a taste for honest work and turns invariably into a loafer and a spieler. Few vices are more detrimental to the moral and material welfare of a farming community. If anyone should be spared contact with that vice it is the farmer's boy, the country lad. I know he is much undervalued and misunderstood by those who have seen him only when he is at a disadvantage—that is, stranded in towns far away from his usual surroundings. But take him in his proper sphere, and you will find him much better armed for the battle of life than a city boy of the same age. He may be deficient in book knowledge, but he is observant and his judgment is sound. He has also the self-confidence derived from a thorough knowledge of his work and surroundings, and the self-respect of the man who works for his bread. He should be taken care of as the soundest element of the coming generation, the soundest foundation stone of our nation. Fortunately the environments are usually healthy and moral.

He has few opportunities of getting infected with the pernicious gambling spirit except on show days. All the lessons which he would otherwise derive from the display of fine horses and cattle, machinery, products, successful men, &c., are lost to him through the presence on the ground of these spinning wheels and other gambling devices. He feels instinctively that he will be got

at—that there is something wrong about it. But, just for the fun of the thing, he will risk his few hard-earned shillings. If he loses he comes home discontented, with the discomforting conviction that he has made a fool of himself. Should he, unfortunately for himself, win, he will find work hard now that he knows how money can be got without having to work for it. In both cases a subtle moral poison has been instilled into him.

I do not apologise to the reader for writing upon the subject and feeling so keenly about it. Those who have read my previous articles in the *Journal* and elsewhere will have remarked that they all tend to the same goal—the settling of a happy and contented agricultural population on the fertile lands of our country. The more I study the question, the more I feel convinced that success in farming does not depend so much on the technical knowledge as on the virtues and moral qualities of the farmer. A gambler will never make a good farmer. Therefore, gamblers and spielers should be rigorously excluded from our show grounds. Should there be still show committees so neglectful of their duties as to tolerate them any longer, the Government, which has already done so much to suppress gambling,* might well consider the question of granting the present endowments to agricultural societies only under conditions forbidding their grounds to be used for the fostering of gambling.

I am glad to see that others have also been impressed with the danger of the evil. I cull the following from one of the best provincial papers of the colony:—"The number of that fraternity known as the spieler class was beyond comparison with other years, and their tables, impedimenta, and trade effects generally were allowed to obstruct a very large part of the ground. In addition to these gentry, there was a very fair sprinkling of an even less desirable class—card-sharpers, three-cards trick, and confidence men generally, whose advent here neither the police authorities nor the show committee are to be complimented upon."

Whilst on the subject of shows, I would like to remark, by the way, that few districts have really suitable show buildings. Their greatest drawback is that usually the windows are too low-set in the wall. The light strikes aggressively on the visitor's eye, and prevents any use being made of the walls for the display of exhibits. For an ordinary agricultural district, the show building should be from 50 feet to 60 feet long by 30 feet or 40 feet wide and 15 feet to 17 feet high. There should be no windows on the wall, except all along the top plates where an uninterrupted row of windows 2 feet or 3 feet high would give an abundant supply of gently attenuated light. Such an arrangement not only more than doubles the exhibiting space, as all the four walls can be utilised, but it allows also roomy skillions, 11 feet to 12 feet high, to be erected on both sides of the building. One comes handy for the display of farm produce; the other for the holding of the show luncheon and other similar purposes. Wherever possible, it is a good plan to make use of an iron framework, and to have the roof curved in the style adopted by the military authorities for their drillsheds. Such a building can be put up, I believe, for from £200 to £300, according to locality and the price of timber. Besides its principal use as a show hall, it can be used during the year for all sorts of social purposes.

Considering that the agricultural societies are formed of the best elements of a district, that they contain men of all parties, creeds, professions, and trades, one cannot help asking whether they should really confine themselves to the holding of annual shows or whether they should not try and extend their sphere of activity and usefulness.

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* We quite agree with Mr. Tardent's remarks on the admission of gamblers and other swindlers to show grounds. They exercise a bad moral influence over the young people, and show committees would do well to consider whether the few extra pounds received from such people for permission to ply their pernicious trade are worth the contamination of the usually guileless country lads and girls.—Ed. *Q.A.J.*

A farm, for instance, cannot be brought to the show. What, is, however, more deserving of a prize than a well-kept farm? Why should not our agricultural societies, either alone or perhaps in conjunction with the Department of Agriculture, grant various prizes for the best-kept farms, or orchards, or vineyards, or plantations, or for the best-grown crop?*

Another matter—

Very shortly many of our rural industries will have to compete with the products of the Commonwealth—some even with those of the world. We cannot expect to be successful in the race so long as we rely solely on isolated individual efforts, laudable and meritorious as they are. Some sort of land and agricultural credit will have to be established to prevent our main industry from falling into the hands of the usurious money-lenders. Co-operation will have to be resorted to for the procuring, at reasonable prices, of seeds and fertilisers, of labour-saving implements; for the introduction of choicest sires in horses, cattle, and pigs; for the wholesale disposal of crops at prices remunerative to the producer without being too burdensome to the consumer, &c. Well, the agricultural societies existing now, nearly in every district, appear to me to be admirably adapted to undertake that sort of work, and thus more than double their present usefulness. They should not attempt too much at a time. Let them make a small beginning in every branch. They could then extend and develop their operations as they gain experience and confidence.

They could do also a great deal for the disseminating of knowledge and sound agricultural notions. In the higher sphere of learning there is now a tendency to decentralise the teaching of sciences. Hence the University extension movement which has made such wonderful strides in England, in various European countries, and in America. Such a decentralisation is still more imperiously required in agricultural sciences. The newest and best obtainable knowledge should be brought to the very home of the farmer and the country lad. The time is not far distant when the best teachers in every branch will travel the country with magic lanterns, cinematographs, and other demonstrating apparatus—nay, with all sorts of real implements and appliances—to initiate and acquaint the people with their science, creating everywhere a thirst for knowledge and new centres of learning. Wherever tried, the system has been crowned with success even in these colonies where we are sometimes sceptical and slow. Suppose, for a moment, that the lectures on dairying, organised a few years ago by the Department of Agriculture, had been given in a Brisbane hall. A few people only would have attended them, and all would have ended in talk and smoke. Instead of that, the lecturers visited the country places, came in contact with thousands of people, resided amongst them, showing their appliances at work, and the benefit to be derived from their use. What was the result? An unprecedented impetus was given to the dairying industry, which, from practically *nil.* as regards both quality and quantity, rose in a few years to a high degree of excellence, and allowed the colony to make 8,000,000 lb. of butter a year, and to export annually over 1,000,000 lb., worth nearly £50,000, besides making 2,000,000 lb. of cheese.

A similar result will invariably follow similar efforts for other branches of farming. And our agricultural societies are the organised bodies best able to take the matter in hand and bring it to a successful issue. In the meantime they should meet every week or fortnight, or, at the very least, every month, to read and discuss papers on agricultural and economic subjects, and make themselves thoroughly acquainted with all the problems pertaining to them. Such papers might sometimes be read by outsiders, but the best are usually contributed by local farmers and residents. In every place there are a few men who have made a thorough success of their farming. Nothing can be more instructive than to hear them explain how they went about it. They

* Or for cottage gardens, as has, on several occasions, been done by show committees. We ourselves hold a medal granted by the Queensland National Association, many years ago, for the best cottage garden, cultivated entirely by the owner without outside assistance.—Ed. *Q.A.J.*

may not be possessed of a great literary education, but that does not matter. As they speak about things they well understand, they usually express themselves in a clear, intelligent manner, often more pleasant to listen to than a more elaborate paper with less substance in it. Such papers, with perhaps a short *résumé* of the discussion accompanying them, could be published in the *Journal*, when they would always be read with interest.

It could hardly be objected that the idea is utopian and not feasible. It is practically already in existence.* For a good few years past the Drayton and Toowoomba Agricultural and Horticultural Society have held such periodical lectures, sometimes in Toowoomba, sometimes in some of the outlying districts in the very heart of the farming population. I understand that up North the Mackay society has a very varied and useful activity, but I have no details on its working. No doubt something similar is being done elsewhere too. Here, in Biggenden, a new district where everyone is pioneering and working hard to make a living, that work has been taken in hand by the local literary and debating society—a very live body which can boast of over 100 members.† We meet once a week, our attendance varying between thirty and eighty members, some having to ride from 15 to 20 miles to attend. Although our membership is only 6d. a quarter for adults and 3d. for children, our finances have always been in a brilliant position. We have procured a circulating library of excellent books, a magic lantern for the scientific lectures, &c. During the last eighteen months the most varied scientific, literary, historical, and agricultural subjects have been studied and discussed. It is an institution, the counterpart of which should be found in every agricultural settlement, as it makes life worth living and takes away any longing for city life. Amongst the agricultural subjects we have discussed, I quote from memory the following:—"The Life and Propagation of Plants," "Beekeeping," "Method in Farming," "The Credit Foncier and other Land Credit Systems," "Agriculture in Switzerland," "Agriculture on the Darling Downs," "Co-operative Dairy Factories," &c. As an example of what is being done here, the reader will find in another place (page 506) the last paper we discussed; it is entitled "Dairying for Profit," and was written by Mr. W. Fowler.

Now, Mr. Fowler is by no means a professor of dairying. Like most of us, he had first to work for wages to keep his family. But, wiser than many of us, he saved a few pounds, invested them in a few good cows, took a selection, and gradually worked up one of the finest dairy herds to be found in Queensland. When I visited his place I found everything clean and in order. The cows, as quiet as lambs, were being milked in the yard without the old bailing and leg-roping process. Mr. Fowler keeps accurate and detailed records of his operations, and can tell within 6d. what every cow costs him to keep, and how much it is worth to him. When he goes to a show, he usually carries off the first prizes, thus showing that his method of farming must be good. No wonder he and his family look happy and contented. It is not they who will curse Queensland, and say that it is not a country for a white man to live in. Whilst I was one day sharing their genial hospitality, I could not help contrasting the picture I had before my eyes with the dairying I had seen some ten or twelve years ago on my arrival into the colony. I then assisted first at a wild steeplechase, the cows, with their tails erect, running for their dear lives in front of galloping horses, and with bloodthirsty dogs at their heels. Then came the "anchoring," both fore-and-aft, of the poor frightened brutes. Next, the letting loose of the calves, which were entrusted with the washing of the udders and teats, and the bringing down of the milk. This was followed by an energetic pugilistic exercise between the

* In South Australia there are 108 branches of the Agricultural Bureau. These each hold regular meetings at which papers are always read by farmers and others, and a *résumé* or often the whole of the proceedings of every branch are regularly published in the *South Australian Journal of Agriculture*. As a rule, in Queensland, the proceedings of some societies seem to be "strictly private and confidential," since we rarely hear about them unless they hold a show.—Ed. *Q.A.J.*

† It could, of course, be as well done by any agricultural society.—H.A.T.

Plate LXII.

Biggenden State Farm.

so-called dairyman and the greedy calf, whilst the cow was looking on in disgust, and quietly drawing up her milk again. After 30 to 45 minutes of these renewed manœuvres, the cow was allowed to go free in company of her calf. As to the milker, he had perhaps 1 to 2 quarts of milk for all his trouble He was no doubt to be pitied, although I am sure you think with me that it is more than he deserved. It goes without saying that he was the whole time cursing his cattle, the country, and the whole creation. He has now left Queensland, declaring it a wretched country where a man would never make a decent living out of farming. I am glad to say the type of such dairymen is getting gradually extinct like those antediluvian pterodactyli which centuries ago outlived their usefulness.

THE BIGGENDEN STATE FARM.

The Biggenden State farm is situated in the Burnett district, close to the Biggenden railway station and township, on the Mungar-Gayndah railway line, and about 50 miles west of Maryborough.

The surrounding country, which lies on the western slope of the dividing range, is very picturesque, the land being thickly timbered, undulating country, surrounded in nearly every direction by beautiful scrub-clad hills and mountains, amongst which Mount Walsh and The Bluff tower prominently at an altitude of over 3,000 feet above sea-level.

The farm itself comprises about 100 acres of suburban land sloping gently in every direction, somewhat in the shape of the half of an egg-shell cut lengthwise. The soil is sedimentary, passing from dark basaltic to sticky cement. It varies in thickness from 6 to 18 inches, and rests partly on good marshy subsoil, partly on sticky clay. In various places the rock emerged on the surface, and had to be blasted with dynamite before it could be made fit for the plough. The predominant timbers are ironbarks, bloodwood, Moreton Bay ash, and blue gum. The farm, which is nearly triangular in shape, is all fenced in with substantial fences and subdivided into four paddocks with lighter fences.

The buildings consist of a neat little cottage for the manager and two sheds. One is used as a barn and stalls for the horses; the other—and this is one of the distinguishing features of the farm—is used as a kind of permanent exhibiting shed. In it are constantly displayed, for the inspection and instruction of visitors, samples of all the crops which have been grown on the farm, to which have been added the various timbers and minerals to be found in the district.

A skillion attached contains the agricultural implements. Between the house and the shed a well has been put down to a depth of 124 feet. The water is lifted by means of a Howard windmill, and then sent by gravitation to a self-regulating trough in the yard. In that way the farm animals have at any time access to water.

There is also on the farm a very complete climatological and meteorological station.

In the cultivation paddock there are 22 acres under plough, 4 of which are occupied by an experimental orchard, containing nearly 200 trees of the more diversified kinds.

About 1 acre is planted as an experimental vineyard with some twenty different varieties of grape vines.

The remainder of the land is constantly occupied by a great variety of crops, experiments mostly successful having been carried on with over 400 different species of field, garden, and other economic plants.

The farm is frequently visited by farmers and others from all parts of the Wide Bay and Burnett districts, who take a keen interest in its work and experiments.

It goes without saying that the visitors are shown every courtesy and every facility to visit everything by the manager, Mr. Henry A. Tardent, who has been in charge of the farm since its inception two years ago.

In looking at the fine photos. taken recently by Mr. Fred. Wills, the Artist of the Department of Agriculture, the reader will with difficulty realise that this beautiful Biggenden district, now dotted with farms and carrying a thriving population of nearly 2,000 souls, was less than ten years ago a grazing paddock of the well-known Degilbo Run.

All the available land has been selected, and there is a pressing demand for more. Steps are now being taken to have land surveyed and open for selection on the neighbouring Degilbo and Wetheron Runs. Although some of that land might be patchy, there is but little doubt that the whole country extending from Aramara up to and beyond Gayndah has an immense future as a dairying, fruit-growing, and general farming district.

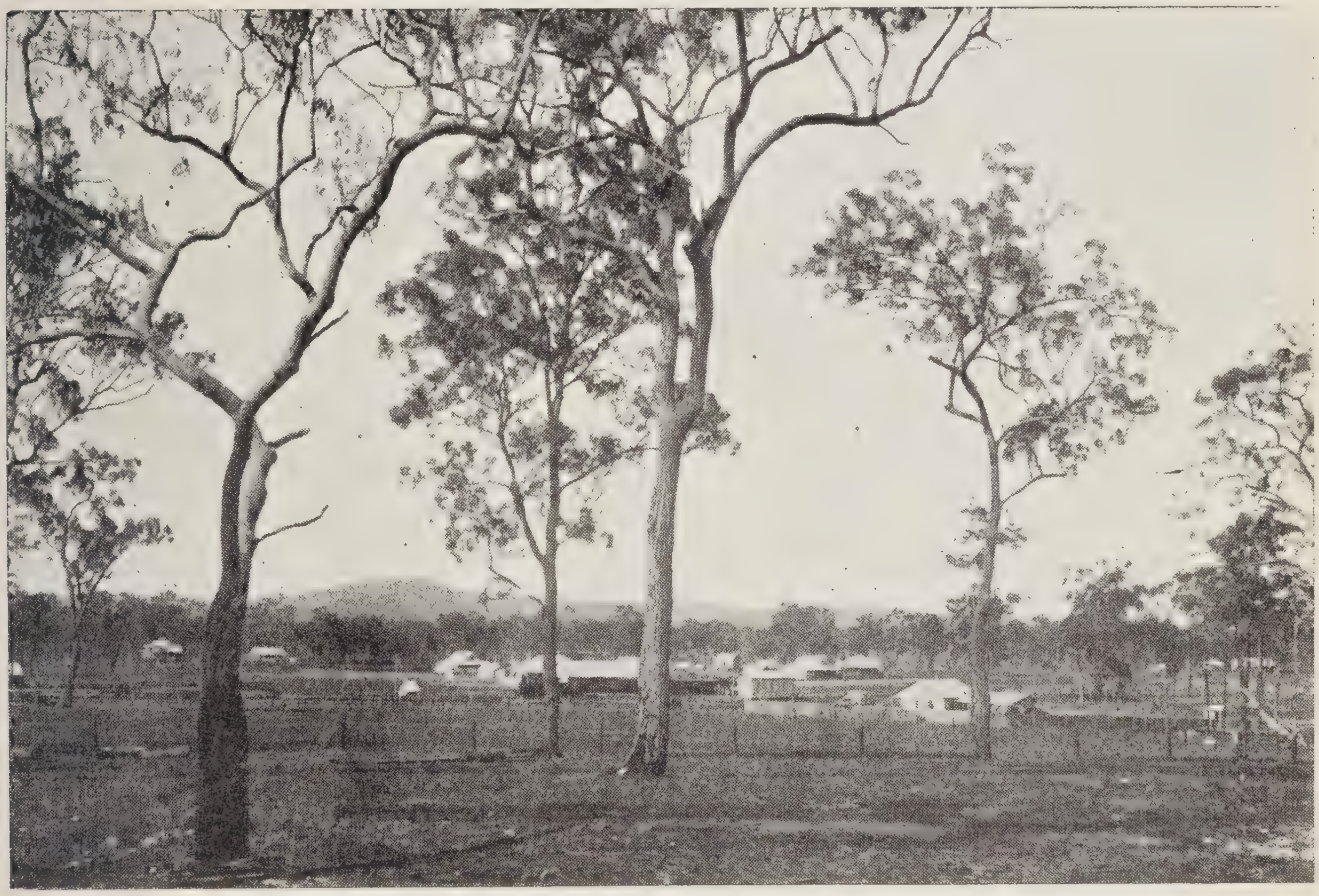
TEACHING AGRICULTURE IN ELEMENTARY SCHOOLS.

The idea that the elements of agriculture should be taught in our rural State schools commends itself to the earnest consideration of all who desire to see a healthy, rural population growing up around us. As matters are at present, there is a growing tendency on the part of the rising generation in the country districts to gravitate towards the towns instead of going on to the land, and by steady application to farming or pastoral pursuits, building up for themselves in the future comfortable homes, where by diligence and economy they may eventually become independent of "billets," either under the Government or in private employ, the remuneration in which is, owing to the severe competition, barely enough to provide food and lodging. On this subject we print the subjoined extracts from the *Bulletin* of the Agricultural Department of the West Indies. At an Agricultural Conference held in Barbados, one delegate said—

"The time has arrived when it is absolutely necessary that elementary education should be made more practical; and I feel sure that these West Indian Colonies will do their utmost, with the limited means at their disposal, to make it so. There has been very little attempt made in the past to draw out and train the faculties of children. Our system must be remodelled so as to draw out these faculties. 'In too many cases' (to quote from a paper by Mr. F. J. Lloyd) 'the sole object of education has been to cram a certain number of useless and disconnected facts, or pseudo-facts, into what is termed the brain. Teachers recognised one faculty and one only—viz., memory; and to train this one faculty to the neglect of every other has been the sole object of education for ages past, and remains so mainly to the present day. It has entirely neglected to develop manual skill; it has neglected to draw out or cultivate any mental faculty save memory; and even for this purpose has utilised subjects, the recollection of which would in no wise benefit the future farmer. But, far worse than this, it has neglected the most valuable of Nature's gifts to all of us, the strongest natural faculty we possess—observation. What is the most striking faculty possessed by a child from three to six years of age? The power of observation. Watch that same child between the ages of thirteen and sixteen, and the power, though at times manifesting itself, is gradually becoming dormant, partly because it has not been cultivated, partly from its constant suppression by the ignorance and heedlessness of those who surround the child. Ten years later the faculty is practically non-existent, lost from neglect of use, as a singer may lose the power of song, or a musician the power of execution. The difficulty now found in improving agricultural education depends greatly upon this failure of the past.' Be ours the task, as far as lies in our power, to try and remedy this defect in our educational systems in the West Indies."

Mr. H. Collens, Acting Inspector of Schools at Trinidad, in alluding to the objection some parents have to their children being taught to do anything entailing manual labour at school, said: "If there is an attempt to make a child

Plate LXIII.



View near Biggenden State Farm. Biggenden Township,

Todd's Farm, Biggenden.

in the schools do manual labour, the parents state their objections very forcibly. I agree with Mr. Hicks that, if our attempts to teach agriculture in elementary schools are to be successful, the greatest possible tact must be shown by the officers concerned. We must not drive or coerce the people; above all, we must try and instil into the children's minds a love of Nature, and the necessity of learning Nature's methods. If we succeed in doing that, we may hope in time to turn their attention to field pursuits and to agriculture generally as a means of earning a livelihood. We must, however, proceed very cautiously. In Trinidad it has been decided that the teachers should, first of all, have a course of lectures, and, in the event of their showing aptitude in teaching agriculture and passing an examination in the syllabus laid out, they are to be rewarded by receiving a bonus on the results of the examination of their schools at the end of each year. That is one encouragement; but we have another. We have made the examination the means for promotion from the third class to the second. That is an important means of influencing the teacher, because it directly touches his pocket. Then with regard to teaching in the schools, we make considerable use of Blackie's Tropical Readers. These are used as alternate reading books. I feel a deep personal interest in this subject of teaching agriculture in elementary schools. I have given considerable thought to it, and I am convinced if we are to do any real good we must exercise great caution, and always place the pleasantest side before the parents and the teachers. Otherwise, we shall fail."

A third speaker took a sentimental view of the question.

"The eyes," he said, "of the country child should be unsealed. He should be made to see the beauties and wonders that lie about his feet and are to be found in profusion all round him. A sympathetic, skilful teacher will invest rural life with an interest that will attract and fascinate. The life that was monotonous, dull, insipid, and purely mechanical will be changed into one full of interest; and with this there will be gained a discipline of the mind, a development of intellectual power which are prominent aims of all true education. The new knowledge and skill will be to the country boy as a new tool, the possession of a new power, and he will be eager to make use of it. What is done on a small scale in a corner of the school plot or in the box-garden will be reproduced at home on a larger scale and with added interest. It will be his delight to show what he can do, and the useful results of his doing. He will find use for his knowledge of reading, writing, and arithmetic in connection with his observations and experiments in the study and mastery of some of the secrets of Nature. He will have a desire to read; and, if we are wise, we shall see that he has opportunity by providing the school with a suitable library and some of the books specially applicable to country life."

In France and in the United States, agriculture has been introduced as one of the subjects to be taught with the express view of preventing the constant drifting of the youth into the great cities. Illinois has now decided to introduce elementary courses in agriculture into the State public schools with the primary purpose of interesting country school boys in what may be their life work. The course will be adapted especially to the country schools, but it will be introduced into town and city classes in a modified form. One hope of those who have been instrumental in securing the adoption of the study is that it may tend to stem the tide of migration of the boys from the country to the city.

EXPERIMENTAL WORK.

Mr. Hugh Pye, Principal Dookie Agricultural College, writing on experimental work during the current year, says:—

Those who have done much experimental work quickly come to the conclusion that the yields of grain are, as a rule, proportional to the thoroughness of the methods of the cultivation adopted.

Thus, where the experiments are small and are thoroughly within the grasp of the individual, the relative yields are high—in fact, exceedingly high sometimes—and, to some extent, are misleading to the farmer, who will not see in the experiment the principle which gives the warrant for carrying out larger experiments. Perhaps, too, the sanguine experimenter impresses the novice to such an extent that it is thought that all that has to be done is to buy the much-talked-of variety of grain, drill it in with a certain amount of manure, and, at the harvest, fill from 10 to 15 bags of wheat to the acre. Now, the more experienced farmer would not be so sanguine, although he may appreciate the spirit of the experiment. He would not rely so much on the variety of the wheat as on the amount of labour involved, the method of directing it, and, lastly, what the total cost compared with the probable net return would be. Then we have the man who owns land, and who thinks that there is nothing under the sun in the farming line that he does not understand. He does not take an agricultural paper, and so keep up to date; he tells you that manures exhaust the land; but in the same breath, when you tell him that five to six bags of wheat per acre were taken off an old cultivation paddock, he says, "Oh, yes! but you used manures"; yet, with this convincing fact before him, he still may not appreciate it, but remain true to his ignorance or want of faith in his own judgment. There is, again, the farmer who tries the experiment and fails, although he has faith in it. There must be some cause for this failure if the experiment has proved a success elsewhere. Where does the failure lie? That is the next question, and here the farmer is often lost; and here it is that the good work of the experimental stations, that are likely to be established over our fertile country, will come to his rescue; and, as time goes on, no doubt, the system will be extended to the carrying out of feeding experiments with stock, both in respect to the production of dairy produce and of meat. I am convinced that the object lessons seen at an experimental station will do more good towards carrying conviction to the farmer of the most suitable methods to be adopted for his conditions than anything else, and they will form a theme for discussion at the meetings of the district agricultural societies, which will be far more beneficial to the farming community than, as at present, devoting so much time to drawing up and altering the annual prize-list.

Some wheat-growers put too much faith in the variety of wheat sown, and not sufficient faith in thorough cultivation. Though, no doubt, certain varieties may be more suitable than others for certain districts, still the fact remains that the yields at harvest-time, other conditions being equal, are proportional to the thoroughness of the methods of cultivation adopted, for, although unforeseen troubles may arise, such as late frosts, boisterous winds, caterpillars, &c., still, if we extend our observations over a series of seasons, the principle of the thoroughness of cultivation stands paramount.

It would be interesting to the wheat-growing world if the weight per bushel of wheat and other cereals was recorded every year at all the principal agricultural centres, as this, with other data, would most likely be of considerable value.

In reference to the effects of manure in the production of grain, there is still scope for much experiment. There are some misconceptions that a good number of farmers have yet to overcome in reference to the manuring of soils; but these are fast disappearing, owing to the research of scientific experimenters, often aided by the experience of thoughtful agriculturists.

In the past I have pointed out that fields manured with phosphatic manures invariably give good returns in the Northern districts, and that light dressings were more economical to use than heavy dressings; but I am not prepared to state that exceedingly light dressings will give consistently the most economical returns when tried over large areas, unless the manure be in a highly concentrated form; for, owing to the want of moisture in the soil, the beneficial effects of the manure can scarcely be said to be felt, which is especially noticeable during dry seasons in late-sown crops not sown on fallow ground.

Plate LXIV.

PANORAMA OF LAIDLEY PLOUGHING MATCH.

The advantages of using concentrated manures or fertilisers may be summarised thus: They are, as a rule, reliable; they have the plant food in an available and very soluble form; the percentage present is very constant, and so facilitates the gauging of results; small quantities have far-reaching effects; and freightage is comparatively less than that of ordinary manures.

The chief disadvantages of using concentrated manures are: The apparently high cost, and the fact that the drills at present made will not distribute, evenly and consistently, very light dressings without considerable caution being taken, which entails extra labour in watching the manure-runs. Damp weather usually affects them, making them difficult to distribute, owing to their absorption of moisture; extra labour must be used, to mix with other matter to give bulk where drills are not expressly made for distributing light dressings of concentrated manure; also extra labour is required in screening the mixture, and extra cost is incurred in the purchase of screens.

The advantages of the less concentrated fertilisers lie in their apparent cheapness. Thus they foster an industry so essential to farmers, and bring the factor of competition with imported fertilisers into play, which tend to lower prices. The manures are as reliable as the certificates state; are in a form ready to be applied; give yields on the whole as good as those obtained from the use of concentrated manures, when applied in quantities of equal money values; do not require so much skill in applying, are more readily obtained.

The disadvantages mainly lie in the extra freight; in the greater variation in quality from year to year, possibly from want of appreciation of detail, and in the difficulty of obtaining supplies of the raw material.

ROOT-GROWTH OF LUCERNE.

All farmers who grow lucerne know that this plant demands a great depth of soil for its root-growth. There are some people who sow lucerne on land having a depth of 18 inches or 2 feet of soil above a sandstone formation, and they wonder how it is that the lucerne does not thrive like that of a neighbour, who may have twenty feet of scrub soil on his farm. Lucerne roots from 16 to 20 feet in length are not phenomenal in Queensland, but the palm for length is taken by the roots in a lucerne (alfalfa) field in Nevada, U.S.A.

In a pamphlet, entitled "Alfalfa—(lucerne), Where and How to Grow It," by Chas. W. Irish, at the time chief of irrigation inquiry in the United States Department of Agriculture, is this statement:—The writer had an opportunity to observe the great depth to which alfalfa roots will penetrate in search of moisture, while making a survey of a mining tunnel in Nevada a few years since. The tunnel was driven in a rock known to the miners as "rotten porphyry." It was much shattered and seamed, and, through the crevices in the rock in the roof of the tunnel, water came out drop by drop; through the same crevices came also the roots of plants. These were found to be alfalfa roots, which came down from an old field of the plant over the tunnel through a depth of soil and rock of 129 feet.

THE LAIDLEY PLOUGHING MATCH.

The fourth annual ploughing match of the Lockyer Agricultural and Industrial Society was held on Mr. John Cook's farm, at Brownlands, Laidley, on the 11th October. There is considerable interest taken in these annual matches, and it is evident that the effect of holding them annually is to increase their usefulness, and at the same time to render the work of management much easier than it would be if they depended merely on the feelings or caprice of those who might feel inclined now and then to arrange for a match. With the Lockyer Society it is now a settled thing, and ploughmen and others look

forward to it, and in confidence to some extent prepare for it, as one of the fixtures of the season. So it turned out that, although the weather was very dry, the land very hard and difficult—in fact, we should say for that class of land it was in its very worst condition for ploughing—the competition, the attendance of visitors, the advantage taken by machinery men to exhibit their farming implements, &c., and the introduction of a miniature horticultural exhibition, all contributed to the always assured success of the Lockyer matches. The first was held at Gatton in 1897; the second at Forest Hill in 1898; the third at Helidon in 1899; and the fourth just held at Laidley on the 11th October. They have all been characterised by a splendid uniformity of success. The present one has resulted in financial success to the extent of about £40, and some of the others have exceeded this, none of them much less. There were eight competitors in the champion class at Laidley, and seven competitors in the other classes of ploughing—fifteen in all. There were other events and competitions, including log-chopping and digging with garden spades; and the entries in these and other events connected with and strictly in keeping with the agricultural interest were over forty. The utility of having a miniature and easily managed exhibition is obvious. It gives the needed variety, and it succeeds in securing the interest of a greater number and variety of supporters, ladies as well as gentlemen, and ladies should, we think, be encouraged to be present, and if present they will do their part, and in these matters we think, too, that it is generally a good part; at any rate, they attend the Lockyer matches, and they contribute to their success. We also think that the committee of the Lockyer Society have done a good work: First, in deciding to carry out these matches annually; and, secondly, because they have persevered in it, despite many obstacles, and the sentiment oft expressed that they were tame affairs, and that there is nothing new in them, and every man can have a match on his own farm, &c., is quite exploded. The committee know, as does every farmer, that the basis of successful agriculture lies in thorough and careful ploughing, as against imperfect and careless ploughing, and that this work of all work should be done well when done at all. Thirdly, the committee have succeeded in securing the attention and support of the public for their matches, and we are assured that they feel a grateful pride in the fact that for years the Minister for Agriculture has recognised their work and helped them materially, and that the National Association has for some time intended to assist them, and has been able this year to do so to the extent of donating to the fund the sum of five guineas. Another noticeable feature of the management is that the committee in their wish to give the ploughman his proper place in society, and to help him to take that place, have arranged that his work at their matches may be done in time to enable him to be their guest at their own table for that day; and among the toasts at the luncheon table on the 11th was that of the "Ploughmen," responded to by Mr. Thos. Burgess, of Forest Hill, and this arrangement proved to be much appreciated, and showed that ploughmen can be found who can not only plough but do other and less useful things—talking, for instance.

It is estimated that there were about 500 people present, the gate-takings were about £18, but all holders of society tickets were exempt, and there were very many of these, so the numbers might have been in excess of what is stated.

The prize list is as under:—

CHAMPION MATCH.

Open to all comers. Possible points, 100

1. James Taylor, Pittsworth, 87 points; prize, £7.
2. David Cooper, Oakey, 84 points; prize, £5.
3. John Tuckett, Rocklea, 74 points; prize, £3.

To the first prize is attached the "Lockyer Plough," a silver model, valued at £10 10s., which, when won three times, will become the property of the winner. Mr. Taylor is the first in the running.

Plate LXV.

Laidley Ploughing Match.

James Taylor, Pittsworth, Champion Ploughman.

Plate LXVI

Laidley Ploughing Match.

1. Agricultural College Team, driven by Student Thomas Kidd.
2. Best Ploughing Team, owner Thos. Burgess, Forest Hill.

Class 2: L. T. Lester, Lake Clarendon, 1st, £7 6s., value and money; on other award made.

Class 3: Single Wheel—B. Corser, The College, 1st, £6 10s., value.

Class 4: Youths under eighteen years—James Bowman, Laidley, 1st, £5 5s.,value. Thos. Kidd, The College, 2nd, £2 13s. value.

Class 5: Yankee ploughs—Thos. Burgess, Forest Hill, 1st, £5 10s., value; Thos. Parkes, Laidley, 2nd, £2 10s.

Class 6: Crown—W. Hindes, Brisbane, 1st, 20s.

Class 7: Straight furrow—A. Chalmers, Mount Sylvia, 1st, 10s.

Class 8: Straight furrow: Youths under eighteen years—Jas. Bowman, 1st, 10s. 6d.

Division II.—Manual Labour, Etc.

Class 9: Digging competition—A. Bowman, Laidley, 1st, £1 10s.; E Goodwin, 2nd, £1.

Class 9a: Physical Drill—Laidley North squad, £1 1s.

Class 9b: Table Bouquet—Mrs. C. M. Ryan, Helidon, 1st, 2s. 6d.

Class 9c: Best Bunch Pansies—Miss E. Doorey, Thornton, 1st, 2s. 6d.

Class 9d: Best Rose—Mrs. A. E. Thatcher, Laidley, 2s. 6d.

Class 10: Log-chopping—A. Bowman, Laidley, 1st, £1 10s.; Gustav Blaso, Laidley, 2nd, £1; S. Whittaker, Broxbourne, 3rd, 10s.

Class 11: Plough Horses—Thos. Burgess, Forest Hill, 1st, gold pendant, value 21s.; John Louis, Willowbank, Ipswich, 2nd, silver pendant, 10s. 6d.; L. T. Lester, Lake Clarendon, 3rd, 5s.

Class 12: Scratch Pull Horses—J. Reddy, Townson, 1st, £1 10s.

Class 13: Lady's Hack—Mrs. C. M. Ryan, Helidon, 1st, 12s. 6d., value; Miss E. Lawes, Laidley, 2nd, 5s.

Class 14: Farmer's Hack, 14 stone—James Crach, Laidley, 1st, 21s., value; Joseph Lester, Laidley, 2nd, 12s. 6d., value.

The judges in the ploughing classes were—Messrs. S. Dart, of Blenheim, W. R. Oxenford, of Coomera, and Thos. Jenkins, of Southbrook, Pittsworth; in the horticultural class—G. F. Kenway; log-chopping, digging—R. J. Blake; miscellaneous classes—H. Daniel and J. Skinner.

Prizes to the amount of over £44 were paid. On account of their Parliamentary duties at the time, no members, not even Mr. Armstrong, could be present; but Mr. Hunter, the Laidley vice-president, presided at the luncheon. Among the guests were Messrs. F. C. Wills, of the Department of Agriculture, and Messrs. Cole and Hayes, representing the National Association. A wire from Mr. Armstrong was read by Mr. Hunter, expressing regret that he and others who intended to come were from the cause mentioned unable to come. A very creditable spread was made by the caterer, Mr. Sinclair; and the arrangement that each guest should be supplied with the farmer's beverage—tea—and other refeshment on payment, worked smoothly and well.

AMERICAN SUPERPHOSPHATES.

Messrs. E. Rich and Co., whose advertisement appears on another page, are desirous of bringing under the notice of farmers, planters, and horticulturists generally an importation of some new American superphosphates, which are said to be of great value as fertilisers.

The value of American superphosphates is very clearly shown from recent results given by the chemist for agriculture in Victoria. An acre plot without the manure gave as follows :—

	£	s.	d.
Two ploughings and harrowings	1	4	0
Seed	1	0	0
Two hoeings...	0	3	0
Earthing up	0	2	6
Harvesting	1	15	0
Marketing	0	15	10
Interest on capital	1	5	0
Total cost	£6	5	4
Value of $3\frac{1}{6}$ tons at 35s. per ton	5	10	10
Showing a loss on the crop of	0	14	6

An acre plot with 2 cwt. of superphosphates at 12s. 6d. per cwt. The financial result then comes out as follows :—

	£	s.	d.
Two ploughings and harrowings	1	4	0
Seed	1	0	0
Two hoeings...	0	3	0
Earthing up...	0	2	6
Harvesting	2	0	0
Marketing	1	15	0
Manuring	1	5	0
Interest on capital	1	5	0
Total cost	£8	14	6
Value of 7 tons potatoes at 35s. per ton... ...	12	5	0
Showing a profit on the crop of	3	10	6

Mr. George Chirnside, of Werribee Park, near Melbourne, gives the following result :—

1 acre of oats, without manure, gave 1 ton 2 cwt. The adjoining acre, with 1 cwt. of American superphosphates, gave 3 tons 7 cwt. 3 qr.

[The value of superphosphates is, in Queensland, from 5s. 6s. to 6s. 6d. per cwt. Probably a duty in Victoria.—Ed. *Q.A.J.*]

Dr. Wagner, of South Australia, gives the following results, obtained in 1897, from Riesling grape vines in tubs :—

Unmanured	0·513 kils. of grapes	
Manured with superphosphates...	2·470 ,,	,,

or nearly five times the quantity over unmanured plant.

Superphosphates when applied to the land partially retrogrades, being converted by the action of the lime contained in the soil into a bi-calcium phosphate, which is less soluble than the superphosphates, and, therefore, is not as easily washed out of the land by drainage. Of course, it must be borne in mind that the great solubility of superphosphates allows the manure to be thoroughly diffused in all directions through the soil, so that when it is applied to the land it can be readily taken up by the growing plant. Where rainfall is unreliable, as in this colony, the advantages gained by the application of superphosphates are, therefore, manifold.

Superphosphates supply the land with lime, phosphoric acid, and sulphuric acid. Our standard grade of superphosphate is equal to 37 per cent. bonophosphate rendered soluble in water.

SUGAR-CANE.

Before deciding upon the quantity of manure most suitable for any particular crop, the most important consideration is the period of time during which the growth continues.

Sugar-cane takes from one to two years to mature according to varying conditions of climate and cultivation. It is not the custom in Australia to practise any rotation of crops on canefields; the soil thus, with the use of the best artificial manures, gradually becomes less rich. Undoubtedly the best way of restoring such land to good heart is to use a moderate dressing of superphosphate of, say, 1 or 2 cwt. per acre, according to the soil. This, not being readily soluble, answers the best of any known applications for this particular crop.

It should be applied at the time of planting, and a second dressing of same amount may be added when the cane is well above ground. This so stimulates the young growth as to make its roots go deeper, and renders the plant more vigorous to withstand subsequent drought or attacks of diseases.

RULES FOR APPLYING SUPERPHOSPHATES.

Keep the fertiliser dry until wanted for use, or the fine powder to which it is ground will be liable to stick together in lumps.

Do not mix lime with it, or nitrogen will be lost.

Use 1 to 2 cwt. per acre for ordinary land, or double this quantity for poor.

For grass, scatter broadcast just before sowing, and harrow in with the seed.

For cereals that are sown broadcast, apply as for grass.

Drilling is strongly recommended.

For vegetables dig in before sowing at such a depth as will suit the particular kind. Roots like the carrot go very deep, while cabbages only descend a few inches.

For potatoes apply in the drills before putting in the seed.

For vines and fruit trees scatter over the ground well away from the stem (for the roots spread very wide), then dig in a few inches with a fork. Two applications will answer best; the first when the buds begin to appear—*i.e.*, about July to September; and the second when the young fruit is formed. A large passion or grape vine requires about ¼-lb. each time, and a large orange tree 1 to 2 lb.

DIRECTIONS FOR SMALL GARDENS.

For potatoes mix about half-a-teaspoonful with a little earth in each hole when planting, then put in the seed and cover up.

For peas and beans mix with the earth in the drill just before sowing. Use half-a-teaspoonful for every 18 inches of the drill.

For carrots, turnips, radishes, &c., mix with the soil to a depth of 2 or 3 inches just before sowing, using half-a-teaspoonful to each square yard, if the seed is not sown in drills.

For other vegetables when planting out seedlings mix about a quarter to a half-a-teaspoonful (a half for a cabbage, a quarter for a smaller plant) with the earth in the hole just before putting in the plant; scatter in a little of the fertiliser, and then cover up again with the earth.

For flowers or grass, stir up half-a-teaspoonful (about ½-oz.) in a gallon of water for a minute, and water the flower beds or pots once or twice a week with the solution. The undissolved sediment, which will contain a little fertilising material, can be utilised by applying it to the roots of shrubs or digging it into the garden. Half-a-teaspoonful is sufficient for a 12-inch flower pot, a quarter for an 8-inch, and an eighth for a 6-inch pot. Rain or watering with a can will gradually carry the fertiliser to the roots of the plants.

COPY OF CERTIFICATE.

Government Authority: Colony of Queensland.

To Messrs. E. Rich and Co., Limited, Brisbane.

I, the undersigned Acting Government Analyst for the Colony of Queensland, do hereby certify that I received on the 18th day of June, 1900, from you, one sample of American phosphates, and have analysed the same and declare the result to be as follows:—

	Per cent.
Phosphoric acid soluble in water (as tricalcic phosphates)	28·3
Phosphoric acid soluble in citrate (as tricalcic phosphates)	10·2
Phosphoric acid soluble in acid (as tricalcic phosphates) ...	0·8
Total phosphoric acid (as tricalcic phosphates) ...	39·3
Nitrogen	Trace only
Organic matter	Trace only

THOMAS McCALL.

At Government Chemical Laboratory,
Brisbane, 6th July, 1900.

The *Queensland Agricultural Journal* for October, 1900, pages 293-4, strongly advocates superphosphates as being an excellent fertiliser of great value, and that 1 bushel of same is equal to 4 bushels of bonedust. And on pages 314-315, giving results of experiments by Mr. Pearson, the Victorian Chemist for Agriculture, states even as light a dressing as 10 lb. of concentrated superphosphate per acre gave an increase of 3·8 bushels of wheat, and 20 lb. per acre gave an increase of 6·0 bushels.

Mr. C. Whitman, gardener to Mr. H. Donkin, "Marston," Nundah, writes: "I have pleasure in stating that I have been using American superphosphates for some months, both for flowers and vegetables, with such excellent results that I consider it preferable to any other manures I have previously tried; in fact, both flowers and vegetables are better and in larger quantities than I have ever before raised on the same land. The manure, too, is very economical, as I believe, to have approached the marvellous results I am having, it would have required at least four or five times the quantity in bonedust or animal manure."

A MARKET IN SOUTH AFRICA FOR QUEENSLAND PRODUCE.

A correspondent in South Africa, well acquainted with Queensland and its productions, writes from Durban that his inquiries have elicited the fact that there is a particularly good demand there for maize and millet. The former, which, as flour and meal, is used throughout South Africa by the kaffir tribes, within and without the pale of civilisation, should be sent out dry (but *not kiln dried*) in 2½ lb. bags (native muid weight) and in 212 lb. sacks. When ground the sack (muid) of 212 lb. runs to 180 lb. only. The millet is the kaffir corn, and is used by them for making beer, as well as for food.

There is a good and increasing market for all kinds of tinned meats, butter, golden syrup, and leather. Australian butter is in great demand. Flours of all kinds are selling freely, and are very firm.

From the produce market prices given in the *Natal Advertiser* we take the following:—Australian butter, 1s. 4½d to 1s. 5d. per lb.; flour, from £9 to £12 10s. per ton; forage (best), £11 to £12 per ton; lucerne hay, £7 10s to £8 10s. per ton; wheaten bran, £7 10s. to £8 10s per ton; sugar, fine yellow crystals, £18 10s. to £19 per ton; finest white crystals, £21 to £22 per ton; common whites, £16 to £16 10s. per ton. Australian meats—Roast beef, 2lb. tins, 15s. 6d. per dozen; assorted meats, 2lb. tins, 16s. per dozen; boiled mutton, 16s. per dozen; corned mutton, 15s. per dozen.

It would appear from the above that there is a good market for much of our produce in South Africa, but the question of freights has to be taken into consideration, especially in the matter of lucerne hay, bran, and such other articles as take up much room, even though well pressed. In December, 1899, prices for agricultural produce were much higher in Natal than at present, yet we then showed that the cost of sending 1,000 tons of hay (dead-weight) equal to about 3,100 tons measurement would amount to over £8,000, without reckoning the value of the hay in Queensland, and the idea of shipping our surplus fodder was abandoned as likely to prove unprofitable. At the same time, there might be profit in shipping millet, kaffir corn, butter, tinned meats, flour, and sugar, which appear to be in active demand, and we hope that further inquiry into the possibilities of trade with the Cape, Natal, and the new colonies, will go to show that such a trade would prove remunerative both to producers and shippers.

CO-OPERATION AMONGST FARMERS.

Co-operation amongst farmer cattle-breeders was started some years since in Switzerland, and has extended into France, where there are now several hundreds of such societies. In practice the following is usually adopted:—Some fifteen or twenty persons in a parish combine to purchase a pure-bred bull, which becomes their collective property. A herd-book is opened, and each member is expected to register for service the name of at least one breeding cow of pure blood, recognised as such by a committee of experts. The finest of the calves thus procured are inscribed in the herd-book as breeding animals—the others are sold. The expert committee periodically inspects the breeding animals, to see that they are well kept, and that the young animals are properly reared. By such means the value of the herd is materially increased, and the fact that an animal is entered on the registers of the society immediately enhances its value.—*Exchange.*

REPORT ON WORK, QUEENSLAND AGRICULTURAL COLLEGE.

OCTOBER, 1900.

Farm.—During the early part of the month the "American Champion Road-making Machine" was at work on the road leading from the dairy to the Lockyer Creek, about 40 chains being formed in a few days, with the aid of two men and six horses. The machine did excellent work. Members, representing various municipal councils and divisional boards, were present by invitation on 8th October to witness a trial of the above machine, and, with few exceptions, all expressed their approval of the work done. "Personally," says the Principal, "I believe that there is a saving of 70 per cent. in road formation by the use of the machine."

The whole of the potato crop (25 acres) was removed at a cost of 16s. per ton, including the cartage of 43 tons 11 cwt. to Gatton. The total yield from the 25 acres was 52 tons 7 cwt.; 43 tons 11 cwt. of which were sold in Brisbane, realising as high as £5 per ton; 2 tons 9 cwt. sold at College; 1 ton 3 cwt. (small) fed to pigs; on hand at College, 3 tons 4 cwt.; and 2 tons small, suitable for pigfeeding. This yield may be considered very good, considering the unfavourable season. The cost of planting, including seed and cultivation up to the time of harvesting, amounted to £3 15s. per acre.

During the second week, $2\frac{1}{4}$ acres of Allora Spring wheat were cut with the reaper and binder and saved for hay, yielding 5 tons per acre, a splendid

return. This crop was planted on the 27th April last, under the following conditions:—

Plot 1. Seed pickled with bluestone; quantity, 20 lb. per acre; depth of planting, 2 inches; area, 1 acre.

Plot 2. Treated with bluestone; area, 1¼ acres; seed, 30 lb. per acre; depth of planting, 1 inch. Regarding the quality and quantity of the above plots, there was no noticeable difference.

Plot 3. Belatourka wheat. Area, 1 acre; 25 lb. seed; planted, 1½ inches deep; manures used, 3 cwt. superphosphate and 1 cwt. kainit, mixed.

Plot 4. No manure; 1 acre; 25 lb. seed; depth of planting, 1½ inches.

Plot 5. 1 acre, 35 lb. seed; depth of planting, 1½ inches; no manure.

Plot 6. 1 acre, 35 lb. seed, planted 1½ inches deep, pickled with lime.

Plot 7. 5¾ acres, 25 lb. seed, per acre; planted 2 inches deep, pickled with bluestone; no manure.

Plot 8. 1 acre; no manure; unpickled; depth of planting, 1½ inches.

Plot 5 produced the best results, the straw being clean and free from flag, and not of such a rank nature as that in most of the other plots; length of straw, 6 feet 10 inches.

Plot 7 showed a good sample of hay, and, no doubt, had it been allowed to stand for grain, the results would have surpassed those from all other plots. There is no doubt that the best results are being obtained from thin seeding, particulars of which will be given in next month's report. No comment can be offered on deep or shallow planting. The length of straw in all the above plots varied from 6 feet 8 inches to 7 feet 2 inches. The crop was a most extraordinary one, yielding 6¼ tons of excellent hay to the acre.

Twenty-two acres of malting barley were cut, harvested, and stored in the hayshed. This crop promises a return of about 40 bushels per acre.

Eleven acres of oats were cut and stooked ready for carting to hayshed. This crop is very heavy and of excellent quality.

Five acres of rye were harvested, returning 16 tons. This crop is stacked and will be thrashed in due course. Three acres (a second crop) were also cut for hay.

Eleven acres of Belatourka wheat is standing in the stooks, and will be carted into the hayshed, which now contains 84 tons wheaten hay, 40 tons lucerne, 16 tons rye, and 46 loads of malting barley.

A field trial of reapers and binders was held at the College during the month. The following machines were represented:—Osborne, Massey-Harris, and the Deering. Although the crop was an exceptionally heavy one, all the machines did good work.

Twenty-one tons ten hundredweight of white Belgian carrots, were removed from a plot of 1¼ acres. A number of rows in this were treated with different manures, but the yield from these (with the exception of that where farmyard manure was used) was no greater than that from the unmanured rows. The manures used were as follows:—First row, one load stable manure; second row, wood ashes. Artificial manures consisted of—superphosphate, 400 lb.; kainit, common salt, each 66 lb. per acre. For the purpose of comparison, a number of rows were left unmanured. The fact that no greater yield was obtained from the manured rows may be attributed to the richness of the soil on which the crop was produced and the dryness of the season. The carrots were put through a pumpkin slicer, and fed to working horses, causing them to put on condition very rapidly.

Two students competed at the Lockyer ploughing match, lately held at Laidley. Student B. Corser was awarded first prize in the single-wheel class, and Thos. Kidd was second in the youths' class. The ground where the match took place was very hard, and plenty of strength was required to hold the plough.

Garden.—The new orchard on the hill has been cultivated and hoed. The young fruit trees have been mulched with stable manure and watered, and are now in a perfect health and cleanliness. The vines have been staked and tied up, cultivated and hoed.

On the Creek.—The orchard has been freely cultivated, and the trees have received attention for insect pests; the latter have been very few. A few trees have been summer pruned and otherwise attended to. Peach-trees are heavily cropped with fruit and look splendid. Fig-trees also show signs of a heavy crop. Oranges have much improved since they were treated with artificial manures (bone-dust and superphosphate). The newly planted fruit trees are looking healthy, and growing well.

Dairy.—The average number of cows milked during the month was 56 head. During that period, 2,101 gallons of milk passed through the factory: 788 gallons producing 797 lbs. of cheese, and 1,313 gallons yielding 499 lbs. of butter. All the dairy stock are in good condition, and are being depastured on the natural grasses.

Piggery.—The natural increase among the pure Berkshires was 42 head, 23 boars and 19 gilts. Among the Middle Yorkshires, the natural increase amounted to 10 head—3 boars and 7 gilts. Grade Berkshires—increase, 10 head.

Mechanical Department.—The new poultry-yards are in course of erection.

GINDIE STATE FARM.

Report on Crops for Month ending 31st October, 1900.

Name of Crop.	Planted.	Area.	Drilled or Broadcast.	Rainfall during Month.	Treatment during Month.	Growth during Month.	Date Harvested.	Quantity Harvested per Acre.	Total Quantity Harvested.
Wheat—		Acres.		Inches.					
American Blue Stem	1-4-00	13·14	Drilled ...	0·27	...	...	15-10-00	...	...
Marshall's No. 3...	13-4-00	31·5	,,	...	...	...	Fed off	...	
Marshall's No. 8...	14-4-00	10·36	Broadcast	...	...	...	9-10-00		..
Oats	21-4-00	1·30	,,	...	...	...	Fed off	...	
Rye	21-4-00	1·05	,,	...	...	...	,,	.	.
Allora Spring ...	28-4-00	9·61	,,	...	...	...	20-10-00	...	
Malting Barley ...	29-4-00	9·70	,,	...	...	...	18-10-00	.	
Field Peas	31-5-00	2·90	Drilled ...	...	...	...	2-10-00	...	...
Budd's Early ...	1-6-00	12·37	Broadcast	...	...	...	31-10-00	...	...
Maize (Early Mastodon)	8-8-00	10·0	Drilled ...	...	...	Poor ...	...	..	...

Remarks.—*Marshall's No.* 3—1 acre cut for hay, 10 acres grazed off by horses and cattle This portion too thin and weedy to pay for cutting. The same remarks apply to the portions of No. 8.

Field Peas.—Owing to dry weather they did not pod very well; will be chaffed up with wheat straw and used for horse feed.

Budd's Early.—About 6 acres harvested for grain. Part of the balance will be cut for hay and the remainder grazed off.

Oats and Rye.—These crops did very poorly and were eaten off.

Maize.—This has made better growth during the month than one could expect, but it cannot hold out much longer without rain.

Highest shade temperature for month	101·0°
,, Solar ,, ,, ...	157·0°
Lowest, terrestrial ,, ...	40·0°

WHEAT IN THE FASSIFERN DISTRICT.

The two accompanying illustrations, taken by Mr. Surveyor Burbank at Clumber, on a farm immediately under the east side of the Range, and belonging to Mr. J. J. Anderson, of Marabarla (native name for "Two Scrubs"), will give an excellent idea of the crop of wheat which has just been cut and stooked.

The variety is "Allora Spring." The soil is a friable black loam, a little inclined to heaviness, but cannot be called a clay-soil, owing to there being a fair admixture of sand in it. The seed (obtained from Gladfield) was sown in June, and was reaped on the 1st November. There was no sign of rust, and the ears were well filled. The fact of this fine crop being grown on the east side of the Range should be of interest to coast farmers, the general opinion being that the best wheat soils and climate are to be found on the tablelands west of the Main Range. Mr. Anderson expects that his crop will show a good yield per acre.

EXTRACTS FROM THE MONTHLY PROGRESS REPORT FOR OCTOBER OF THE BIGGENDEN STATE FARM.

I regret to have to report that October has been characterised this year by exceptionally dry weather, accompanied by westerly winds, extremely trying to all vegetable and even at times to animal life. Only 0·81 inch rain fell in three days.

At the same time the nights were cold for this time of the year, the grass thermometer being for weeks at or close to freezing point. As a consequence, the various crops previously sown did not make all the progress desirable, and those freshly sown have remained for weeks dormant in the ground. It might happen that some will have yet to be resown.

During the month the barleys and a large number of the nomenclature wheats have been harvested. The barleys will turn out very fine samples of grain, thus showing that this cereal, for which there is now a remunerative market in these colonies, is well adapted to the soil and climatic conditions obtaining in this district. As to the wheats we have got—as last year—our best results were obtained from the hard and flinty maccaroni wheats, such as Medeah, Bancroft, Laidley, &c., and especially from the good milling artificially cross-bred wheats of Mr. Farrar's collection.

As soon as the wheats were removed, the land they had occupied was ploughed and subsoiled in one operation by means of a very simple and inexpensive fixture of our own device, which is adaptable to any strong double-furrow plough, such as the Mitchell we use here. The work is of better quality, requires less horsepower, is lighter on the man, than with the subsoiler we used to have at first. It requires only one man instead of two, and that man does exactly 100 per cent. more work than the two men employed formerly. Its main advantage, perhaps, is that the horses do not tramp on the subsoiled furrow. This leaves the field as porous as a sponge, which allows the gases of the air to permeate it throughout. We might say that efficient and cheap subsoiling, so beneficial in this climate to most crops, is now within reach of any farmer possessed of a double-furrow plough and three or four good horses.

The orchard is in a high state of cultivation.

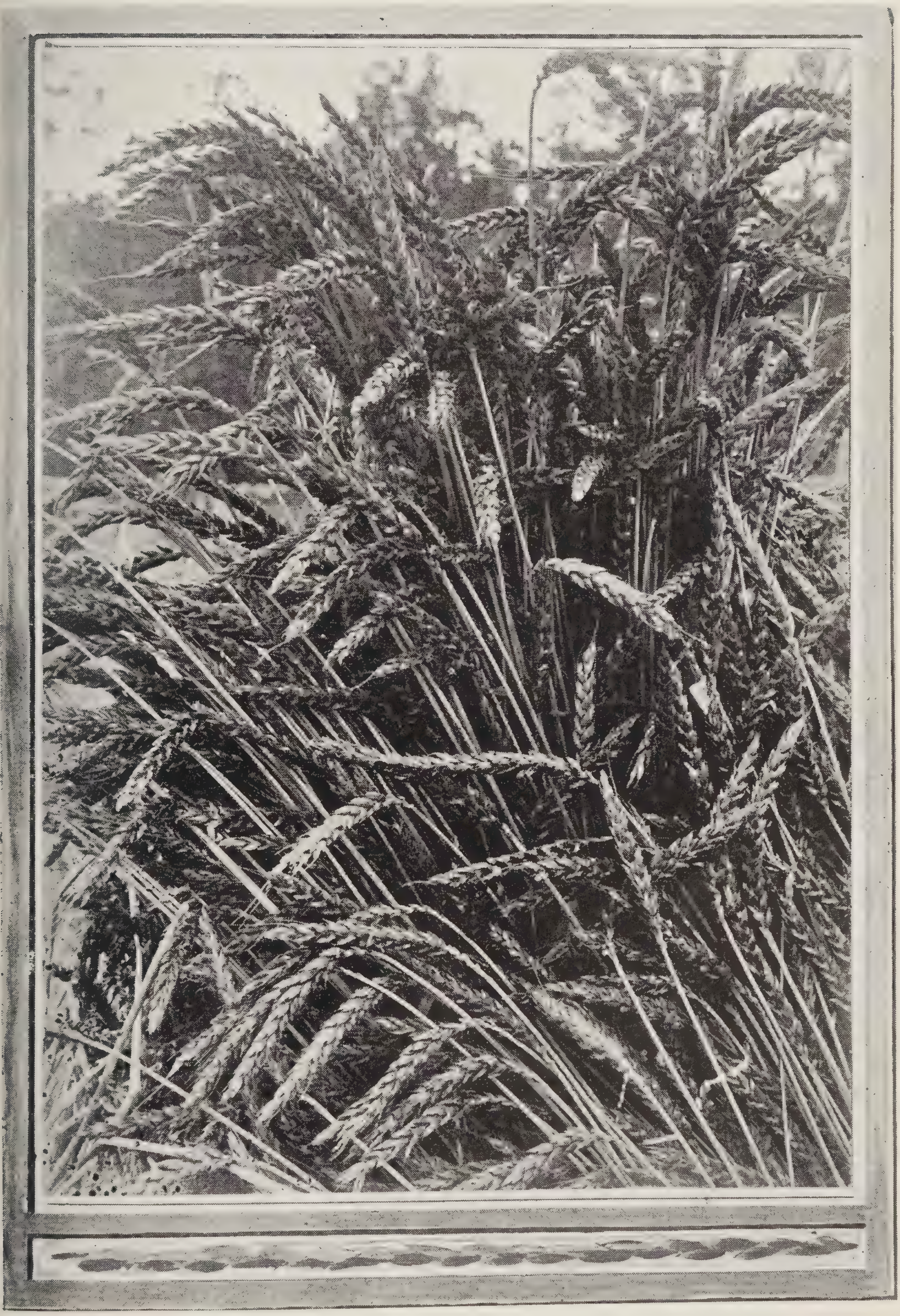
In accordance with Mr. Voller's directions, the spaces between the trees have been sown with velvet and Mauritius beans and with cow pea. For the former there are between the trees three rows, 6 feet apart, the beans being from 12 to 15 inches apart in the row.

Of the cow pea there are in each interspace (of 32 feet) five rows 3 feet 6 inches apart. The seeds were dropped 12 inches apart in the row by means of a Planet Junior hand seed drill.

Plate LXVII.

Allora Spring Wheat, grown at Fassifern.

Plate LXVIII



Allora Spring Wheat, grown at Fassifern.

That work was done with a view to utilise the available land whilst the trees are yet small, and to improve the soil by means of the nitrogen-producing microbes living on the roots of most plants of the Leguminosæ family.

The drills were drawn across the slope of the land; thus no soil can be washed away during the approaching storm and rainy seasons.

Some thirty trees which gave signs of stagnation in their growth have been watered by hand. Mr. Voller has, during the month, attended personally to the summer pruning and shaping of the heads of the trees.

In the vineyard the vines have also been personally attended by Mr. Rainford.

It is an ill wind that blows nobody good. The present dry season is eminently apt to show the advantages of certain workings of the land and methods of sowing.

In our lucerne plot, for instance, the growth during the month has been only from 3 inches to 6 inches in the part when sown broadcast, whilst it reached from 12 inches to 18 inches where the seeds were sown in drills. I venture to affirm that, when sown in drills on well-subsoiled and pulverised land, lucerne will stand dry weather to an extent hardly credible to those who have not tried or seen it.

In like manner the cabbages and cauliflowers had an opportunity of proving their hardiness and drought-resisting qualities.

In spite of the adverse season, some of the Large Yorks turned the scale at 12 lb., the Mason's and Drumheads at from 15 lb. to 18 lb. The Flat Dutch, the Improved St. John, and Succession gave all medium-sized, good, sound hard heads.

Amongst the cauliflowers the Large Asiatic is here the most profitable and the surest cropper. The quick-growing and more delicate varieties seldom do well in this climate and latitude.

RAINFALL AT EMERALD.

As the Central districts of Queensland are rapidly coming to the front in the matter of wheat-growing, and also in the cultivation of other cereals, such as barley, maize, &c., we print below, in the interests of present and intending growers of their products, a table of the monthly rainfall around Emerald for the past fourteen years. It should be borne in mind that successful cultivation, where irrigation is not available, depends not only on good mechanical work in the field, but on a certain amount of rainfall, without which all man's labour for a whole year may be thrown away.

Taking first the wheat months, say from May to October (in the district under notice), we find that as a general rule, excepting the year 1888, the rainfall has proved ample for the requirements of the wheat grower. The yield of wheat at Emerald last year was 2,099 bushels from 97 acres, or an average of 19·94 bushels per acre, notwithstanding that some fields were attacked by rust. For 1899, 413 acres were sown with wheat in the Central districts, of which 224 acres were reaped for grain, and in that year there were 27 wet days from May to October, or an average of 4·6 wet days per month. There was, however, only one wet day in June at a time when the young wheat crops would have derived great benefit from moisture.

Next month we propose to publish the rainfall for the Clermont district, and in the following month that for Springsure.

EMERALD.

Month.	1887.		1888.		1889.		1890.		1891.		1892.		1893.	
January ...	2·25	4	1·54	3	1·12	4	7·70	14	9·30	19	1·48	9	3·48	7
February ...	5·98	8	7·23	16	0·17	3	6·19	13	1·63	9	0·78	6	1·45	11
March	4·75	5	*	...	*	...	13·37	23	3·26	10	0·06	2	3·93	11
April	3·95	4	Nil	...	5·63	9	0·93	10	1·64	5	1·34	3	3·07	9
May	0·55	5	0·28	1	1·92	3	2·70	10	3·70	8	3·19	6	1·04	6
June	0·82	4	*	...	0·81	2	1·69	7	3·80	4	0·17	1	5·71	9
July	1·12	4	Nil	..	2·83	5	0·83	6	0·18	2	0·71	4	2·30	6
August ...	2·59	4	0·27	2	0·61	4	1·87	5	1·80	3	Nil	...	4·24	6
September ...	0·60	2	0·26	1	0·88	6	4·11	6	0·24	3	2·62	7	0·38	2
October ...	0·35	4	0·64	2	0·78	5	*	...	1·22	5	2·74	7	3·60	8
November ...	0·56	3	1·93	4	4·63	10	0·25	2	0·43	4	1·92	5	1·02	6
December ...	4·37	10	0·56	5	7·51	10	6·00	15	3·81	10	1·93	8	0·78	6
Totals ...	27·89	57	12·71	34	26·89	61	45·64	111	31·01	82	16·94	58	31·00	87

Month.	1894.		1895.		1896.		1897.		1898.		1899.		1900.	
January ...	4·19	13	7·96	16	9·08	6	4·37	10	10·87	16	7·05	11	3·08	9
February ...	4·62	8	5·89	9	8·63	20	1·23	4	8·28	17	2·99	7	1·22	2
March	3·70	9	0·13	2	1·07	4	0·59	5	2·49	4	3·00	9	3·97	5
April	3·07	8	2·12	3	1·26	4	Nil	...	0·13	2	2·60	6	0·42	3
May	1·77	8	1·02	5	0·90	3	Nil	...	0·89	2	2·43	4	2·72	7
June	3·68	5	0·05	1	0·25	3	3·35	3	1·89	6	0·03	1	1·15	2
July	Nil	...	2·06	9	1·81	6	0·29	2	0·40	2	1·31	8	3·96	5
August ...	0·80	2	0·01	1	1·75	4	2·54	3	0·82	4	2·08	5	0·52	3
September ...	4·80	8	0·28	2	1·38	2	0·94	4	2·72	7	1·96	4		
October ..	3·02	9	0·38	3	0·22	2	4·75	8	0·87	4	1·93	9		
November ...	1·84	8	1·57	9	1·23	4	1·93	6	0·69	2	1·32	5		
December ...	3·05	9	4·42	11	1·89	6	3·83	5	3·47	6	0·40	1		
Totals ...	34·54	87	25·89	71	29·47	64	23·82	50	33·52	72	27·10	70	...	...

17·04 inches for 36 days.

* No Return.

LISTING MAIZE.

There is a method of planting maize in the drier prairie States of America, particularly Kansas, Nebraska, and Iowa, known as "listing." The chief implement employed is a double mould-board plough, called a lister. It is worked usually by three horses, and throws the earth equally to the right and left. The lister generally has a sub-soiling attachment, a corn drill, and a contrivance for covering the seed. The lister cannot be used on unbroken sod land, but it may be used on other land with or without previous ploughing, usually without. The lister simply strikes out furrows 4 feet apart, at the usual depth of ploughing—say 6 inches; and the ground thrown right and left covers the intervening unploughed space with fresh earth. At the same time the implement breaks up the subsoil and plants and covers the grain. The great advantage from the standpoint of saving labour, of doing all the work of ploughing, sub-soiling, planting and covering the seed at one and the same operation, is apparent. The following rough sketch of a field in cross-section will make clear the condition of the listed field after the plants are well up from the ground :—

The subsequent treatment of the field planted as above, does not differ materially from that given the crop as ordinarily planted. A light harrow, worked lengthwise of the rows, is usually first employed. Afterwards the common two-horse "Yankee" walking cultivator is used, at first with a Λ shaped box (A), about 3 feet long, made of 2-inch planks, which moves with the implement between the two cultivators, and prevents the earth, as it falls into the furrow, from covering the young plants. Before the field is "laid by" it is as level as though the grain had been planted on the surface. Let it be understood that this method is only practicable upon comparatively level black-soil lands. Where the ground falls uniformly in a given direction the listing should be done at right angles with the slope, never up and down the hill, for the obvious reason that in the latter case, the furrows become channels for the water, which is almost certain to wash out much of the young crop. The advantages of the listing method are (1) listed corn having its roots in the deeper undersoil is not so affected by drought, as that which is surface planted; (2) the cost of growing the plant is reduced by one-fourth to a third; and (3) the listed field gives a larger yield than that obtained by the common methods of planting.

QUEENSLAND SETTLERS AND FARMERS' HOMES.

Part IV.

By FRED. WM. PEEK, Loganholme.

SOWING THE SEEDS.

The cultivation of flowers is a labour both fascinating and pleasing, and it was a step in the right direction when the recognition of the importance of the early training and teaching of the young in our schools by creating an Arbor Day was recognised by the Department of Education. Anyone paying a visit to some of our country schools can see the results attained by the energy of the teachers in charge, who have succeeded in creating very pleasant surroundings, with the assistance of the pupils under their charge.

I might add that it is in the school life that the farmer must be made by early teaching and training, and nothing assists more to that end, I am sure, than creating an early love and liking for flowers and gardening pursuits. Therefore I may urge upon our farmers to spare a few moments a day to the cultivation of flowers. It creates a healthy rivalry among the members of the family and their neighbours; it promotes enthusiasm and more sociability, besides being the means of disseminating information on the various subjects of plant life and growth. The "home garden" is one of the best object lessons our farmers' children can possibly have; once their sympathies are aroused, they will eagerly watch and observe the opening of new buds and blossoms, or the germination of seeds, all of which engage their attention, and foster habits of care, diligence, and observation, and which will form the true basis of success in the farming and agricultural pursuits of their after-life. Having followed the instructions given in the last number of the *Journal*, Part 3 of this article, on the preparation of the seed beds, I would like to give a few hints on the sowing of seeds, as they may not be out of place here. In many cases we hear of failure of seeds to germinate, and in nine cases out of ten it is put down to bad seed, when in reality the fault in most cases rests with ourselves.

There are two points of the utmost importance in connection with seed sowing to attain success in germination as well as strength and regularity of the crop that will be obtained from good seed. These are: First, the proper condition of the soil at the time of planting; and, second, the regular and uniform depth at which the seed is sown. The three essentials necessary for the germination of seeds are—air, moisture, and a certain degree of heat in the soil; without these agents, the process of germination cannot go on. The soil is the medium by which a supply of air, moisture, and heat is kept up; therefore it is most important that the soil be in proper condition.

When the land is very dry, it contains too much air and too little moisture. The proper condition of the soil for the successful germination of the seeds is when it is neither wet nor dry, but moist. A test can be made by taking up a handful, and if it easily crumbles to pieces in the hand, having the appearance of being newly watered, it will be found correct for planting. The chief point is to get the soil well pulverised, and then, with also proper drainage, it will be found in a condition favourable for germination, although temperature also has a great deal to do with seed germination and the time it takes (generally it will be found that seeds grow more rapidly in this colony than in the southern colonies or the old country), because the higher the temperature the more rapidly does germination go on. It will be found, when the air is warmer than the soil, the surface soil will be warmer than that below; when, on the other hand, the air is cooler, the surface will, by contact, cool much more rapidly than that below the surface. Seeds near the surface will generally grow most rapidly; the germination of some seed will take longer or perhaps perish if planted too deep and will not grow at all, the temperature not being sufficiently elevated and the supply of air being too limited to set the chemical or natural process at work which is required for successful germination.

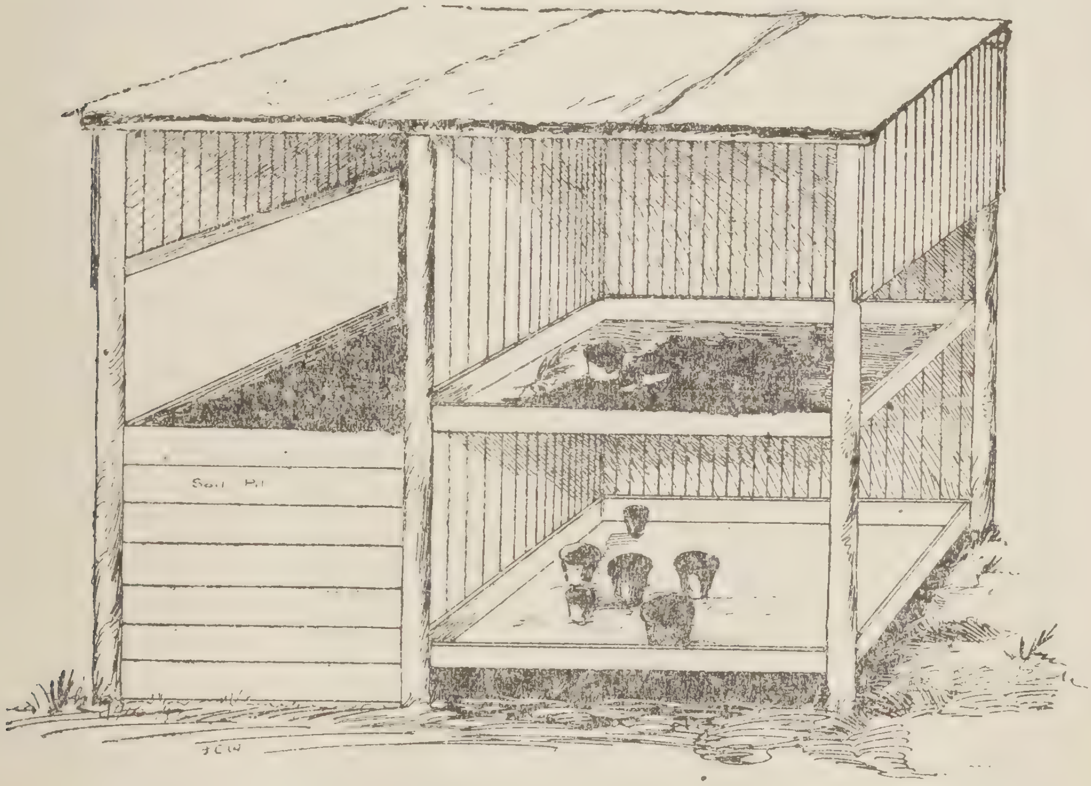
SOWING SEED IN POTS, ETC., AND POTTING.

In sowing the seeds of tender plants, it will be found better results will be obtained by, instead of sowing in the open ground, if such seeds were sown in shallow pans or boxes or flower-pots, using a very porous soil, and having the pots or boxes well drained. Such seeds as eloxinias, primulas, cinerarias, and even pansies are better for being so treated. The nature of the soil used for this purpose must be determined by the variety of plant or seed we wish to grow. For instance, the begonias—plants which include in their number some of the most handsome in foliage—require a rich soil, very porous; whilst the caladiums, crotons, &c., require a stiff rich loam. The following will make a very rich and general useful soil for pot plants:—Mix equal parts of well-decomposed turfy loam, well-decomposed cow manure, charcoal, with good sharp sand, which must be thoroughly sifted and mixed. (The above ingredients can be altered to suit the various plants by adding a greater or less proportion as required.) It will be found very handy to have a light structure erected for a potting-shed, with a box or pit in which the soil can be kept in a dry state, as it is advisable not to use wet soil in potting; but immerse the pots in water immediately after planting, which is preferable to watering overhead, as it prevents disturbing the seeds and also the hardening of the surface.

Although these articles were originally intended to give a little information and advice as to the formation of a settler's or farmer's home, to make, if possible, more cheering and pleasant surroundings, we must not forget that in doing so there is money to be made by the sale of flowers. Some of the leading florists in Brisbane and other towns have to send long distances to procure blooms for sale and decorative purposes, and perhaps some of the enthusiastic readers of this *Journal* may deem flower culture of such importance as to start cultivating with the end in view of becoming professional florists. Certainly it is one of those avocations that can be indulged in by the feminine members of our farmers' families as being not laborious work, but work specially adapted for gentle hands, besides being very remunerative.

Florist's Flower Garden.—The florist's flower garden comprises nearly every known variety suitable for cutting and making up into buttonholes, sprays, bouquets, &c., as well as for table and general decoration; chiefly may be mentioned the violets, carnations, pansies, pinks, picotee, dahlia, chrysanthemum, roses, tuber roses, and various other varieties. A florist's flower garden is usually planted in straight lines, and in beds collectively—that is, each variety to itself—because such an arrangement is more handy for treatment and also for the cutting and collection.

Florists' flowers, as we see them of late years grown in this colony—and especially by those florists near Brisbane, Ipswich, Toowoomba, and other large centres—prove how large is the field which Nature throws open to enterprising gardeners and those settling in Queensland. A visit to the horticultural shows held in the various centres strikes a newcomer with the wonderful results attained by the industry and intelligence of our gardeners. When anyone compares the different flowers exhibited, which have passed under the florists' hands for cultivation, with their wild originals, or as they have been seen in other and less genial climatic conditions, it proves the marvellous results which follow from the ingrafting of nature and art. If we compare the pansies, the pinks, the hyacinths, the chrysanthemums of our recent prize shows with those we were familiar with some few years ago, it is hardly possible to realise the progress that has been made.



Potting-shed.—The accompanying sketch will give an idea of a shed suitable for potting plants, being constructed of ordinary split bush wood and saplings, if sawn timber is not available. Iron or bark will do for the roof, half open at the sides, front open, back enclosed. Pit for soil on the left hand of shed to be kept dry. The plan is on the scale of $\frac{1}{2}$ inch to 1 foot. It can be made by any one handy with a few tools.

PROPAGATING OF PLANTS BY STRIKING CUTTINGS, LAYERING, Etc.

Everyone who takes an interest in gardening will have a desire to propagate some favourite plant, or it may be he possesses a valuable plant that it is desirable to increase the stock of. In a state of nature, all plants are propagated from seed or by the root runners, or by branches coming in contact

with the soil, when they will take root and reproduce themselves. Other means are adopted by nurserymen, florists, and others, in which a certain amount of skill is required. This would include budding, pruning, grafting, root pruning, disbudding, training, and transplanting.

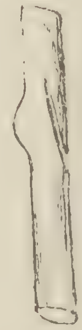
Propagating from Seed is the easiest to be understood by the ordinary individual, but it is often found that this is a slow process, and not always satisfactory, because the seed sown does not always produce the same identical plant, owing to inoculation by bees and other insects. Not only is there this drawback, but it is found that very few of the so-called double, flowering plants seed at all. I have at the present time a fine bed of stocks raised from seed taken from single-flowering plants of the last season, the majority of plants coming with double flowers this season, and carrying no seed-pods. It will also be found that very few of the herbaceous flowering plants in our gardens ripen their seeds sufficiently for successful propagation.

Propagating by Cuttings.—This is another well-known and popular method of increasing the various species and varieties of plants, especially the soft wooded varieties, which will be found to root best in some cases from young wood, and in others from firm or well-ripened wood, a good plan being to leave a heel of the older growth on the intended plant. If that cannot be readily obtained, then take the cutting off the stock immediately below an eye or bud. Other systems are by root cuttings, and other methods of multiplying as many plants have crowns with buds or eyes each capable of propagating its species. Every plant of this description may be cut and divided into as many portions as there are eyes, taking care in the cutting. The plants so treated include ginger, potatoes, dahlia, &c.

Propagating by Layering.—Layering such plants as carnations, pinks, roses, &c., is often found to be the best mode of increasing the above variety of plants, and will generally be found successful where cuttings have failed. Layering consists in arresting the circulation of the sap on its return to the roots. The manner in which this is done by myself is as follows:—I choose a suitable branch of, we will say, carnation, for instance, which is first stripped of all branches and leaves below the joint to be operated on; then I take a very sharp knife, make a cut about a quarter of an inch below the joint, passing the knife upward in an oblique direction to a quarter of an inch above the joint, taking care that the cut terminates in the centre of the stem. Then I cut off the tip of the end or tongue thus made, and proceed to peg it down in the soil, leaving it attached to the parent plant.

Fig. 2 shows the cut.

1



2

Example of Layering.—Plant cut and pegged down (Fig. 3). The best time for layering most plants is immediately after the flowering season is over. Always take for your layers those stems or branches that have not produced flowers. In layering roses or other shrubby plants, run the knife through a

joint to make an opening or crack near it, and then firmly peg down quite 3 inches below the surface, pressing the soil firmly round the wound, leaving the branch above the soil as upright as possible. If the soil is kept moist the roots

3

will soon form, when the new plant can be separated from the parent tree and removed to any desired spot, when it will produce the same blooms, &c., as the original stock.

Pruning.—It is hardly necessary for me to occupy space in repeating what has already been most minutely and exhaustively described by previous writers on this subject, and which has been illustrated in previous numbers of this *Journal*, except that I might add that the best time for pruning is before the sap commences to rise. When a tree has reached its bearing state, the main object of pruning is the production of flowers or fruit. My advice is—if the branches are well placed—let them have free course, but all unproductive wood, decayed branches or twigs that cross each other, should be cut away, the tree being kept open in the centre. It will be found in some cases, when a tree is very vigorous, the buds will break strongly, making plenty of wood and foliage, but blossoms are very scarce, and, consequently, no fruit is the result. In such cases it is advisable to prune the roots. This is an important operation and requires a little skill and experience, and I would advise those who desire to experiment to ask the advice of a qualified nurseryman in their locality before commencing. Root-pruning is done to check the growth of a tree. If the tree is extremely vigorous, two-thirds of the stronger roots can be cut through. The usual method I have adopted is to make a trench round the tree, at about the same distance as the branches extend from the trunk, going down from 18 inches to 2 feet, according to the growth and variety of tree to be operated on. Then, with a sharp knife or axe, cut through the strongest roots, filling up the trench again with fresh soil. This will cause the tree operated upon to send out a lot of small fibrous roots, which will take up the sap and form blossom buds, producing fruit.

Transplanting.—This is another important operation with the gardener and fruitgrower, and, as we have such innumerable varieties of every kind of known plants, shrubs and trees, whether for fruit or shade purposes, that have now been acclimatised in this colony, and suited to the various climatic conditions, it is almost impossible to state any fixed time or portion of the year for transplanting; but, as a general rule, shrubs and trees of the non-tropical varieties will do best if transplanted from May to July, whilst tropical plants will do better if planted out in the early spring, or, say, from the latter end of August till December. Care must be taken not to overcrowd, and I would advise our farmers to obtain copies and look up previous articles published by the Departments by practical growers and experts on this important operation.

Dairying.

DAIRYING FOR PROFIT.

PAPER READ BY MR. W. FOWLER AT THE BIGGENDEN LITERARY AND DEBATING SOCIETY'S MEETING OF 10TH OCTOBER.

Dairying has many advantages in Queensland, and the farmers in this district have a good chance of making it one of the best dairying districts in the colony. It has been proved by the results given in the *Agricultural Journal* of the Biggenden, Mackay, Maryborough, and Brisbane milking contests that the winning cow at Brisbane was in the first of the above list, and excelled her rivals by 6 lb. of milk and ·127 of commercial butter per day. With this one exception, our district is first, as shown by the *Agricultural Journal*. This being so, there is no reason why we should not still hold our own, and even do more. This can be done by improving our cattle, bettering our methods of working, and by feeding our dairy cows.

We will now consider how we can improve our herds for dairy purposes. As the bull is half the herd, we will first deal with him. He must be a dairy bull. He must be a thoroughbred of whatever breed you choose, as no other can be relied on to transmit the characteristics we require in a profitable dairy cow. We must not lose sight of the fact that breed, without milking quality and quantity, will be only disappointment; therefore we must not fail to get the milking record of the dam of the cow we purchase. This, I know, will often be more difficult than getting a pedigree as long as your arm; but this milking record should be got, if possible. Now, we have a first-class dairy bull, and if we are to get the best results in future we must take the very best care of him. He being half the herd, and only one head, we ought to be able to stable him at night and feed him well. If this is done he will always be in good condition, and will be kept quiet, with the result that your calves will be stronger and will grow up quieter. Now, as regards the working of your cows, do you know what milk and butter your cows give? If not, get a spring balance and weigh your milk and cream; enter the weights in your milk-book night and morning; and when you churn, weigh your butter. You can then tell how many pounds of milk it has taken to make a pound of butter; and if you are sending away your cream, you can then tell what test it ought to be by your churn-test, as 2 lb. of 4 per cent. cream should make 1 lb. of commercial butter.

Again, you want to know what amount of milk each cow gives in twelve months. Now, to weigh each cow's milk separately would mean a great loss of time; but take a slate—or, better still, a piece of pine board—with the names of the cows printed on them, and weigh each cow's milk night and morning, say the last day of each month. Register this in your milk-book; then, by adding this and the last month's milk together, and then dividing, you will get the weight per cow per day for the last month, at least near enough for all practical purposes. This will show the value of each cow, whether she is worth keeping or not; besides, you will have her milking record to refer to later on. If it is our intention to improve we must cull out the worst as soon as we can do without them. It is easy to know your best and worst cows, but you will find that, when you have a twelve months' record, there are many of them not what you expected—some much better, others the reverse. A cow that gives a lot of milk at first, and then goes dry in about four months, will not do. She is too long idle to pay. A good cow will milk ten months out of the twelve—that is, she should only be dry for eight or ten weeks. Most farmers say, "This is too much trouble; I cannot be bothered; I have not the time to spare," &c. Now, this is a mistake. The greatest trouble is to begin. When

once you make a start the trouble will appear very little, and before long you will find it a pleasure instead of a bother. The time spent is not much compared with the benefits you will derive later on by finding out your unprofitable cows and getting them out of the way as you require both their room and their feed.

And now this brings us to one of the most important points in improving our herds, and that point is—feed. The limitation of dairying is the food supply. Every dairyman knows that as soon as the grass gets dry and short the cow gives less milk, and if we are to get the best results from our cows we must feed them. A cow that is worth her food should never be kept short. A cow on full rations requires two-thirds of this to enable her to perform the offices of life; therefore all profit that comes from the cow is derived from the food she receives over and above the two-thirds. How, then, can we expect to get any profit from half-starved cows? And as long as the herds are kept in this low condition, there can be very little improvement.

But I am told that it does not pay to grow feed and feed it to the cows. This, I think, is a mistake. Try a few of your best cows. I think you will soon find it pays better to feed a green crop to them than if you had sold it as chaff. Green feed of the same sort can be grown nearly all the year round, and fed when required. I myself have only a small area of agricultural land; therefore cannot feed much. Still, the cows I have fed have given me great satisfaction, and I will give you some of the results—that is, the quantity of milk of certain cows when fed, as against the milk yields when not fed. Lady, calved 10th July, 1899, and was not fed. During the first two full months, August and September, she gave 877 lb. of milk, and 36½ lb. of butter. The average amount of milk of the herd required to make 1 lb. of butter was 24 lb. for the two months. This same cow calved on 23rd May, 1900, and was stabled at night and fed for the first two months—June and July—during which she gave 1,692 lb of milk and 82½ lb. of butter. The average churn test for these two months from the herd is 20½ lb. of milk to make 1 lb. of butter, so that from this same cow we have, for the two months' feeding and shelter at night, 815 lb. of milk and 45½ lb. of butter. The feed was green oats, barley, and rye, and about 5s. worth of bran. I think this will show that we must feed our cows to know what they are, and it is a proof that breed without feed will not make the big milker we require. I will give you another instance to show the difference in the amount of butter produced by feeding a different class of cow—Victoria. In 1898, without feed, this cow gave 207 lb. of butter in twelve months. In 1899 she was fed in June, July, and August. During this twelve months she gave 264 lb. of butter, and in 1900, with the same treatment, there is ¼-lb. difference only. This gives 57 lb. of butter for the three months' feed. Thus our object is to find out those cows that will pay to feed, and get rid of the bad ones. We will now deal with the calves—*i.e.*, the future herd. The calf from a bad cow is not worth the milk it will drink. It would be better to kill all such, and all the bull calves as well. Where all the calves are kept and hand-fed (they should be always taken from the cow and hand-fed if you are to get good cows), as soon as the flush of milk is over there is not enough milk for them; therefore it is better to keep only the heifer calves and feed them well. To many farmers this killing does not at first seem right, but as most of us have only small areas we want the grass for our cows. Again, every dairyman should keep pigs, and the pig brings the quickest return. Now, to feed a calf well you require at least 3 gallons of milk a day until the calf is five months old. What would you get for it then? Very little if you wanted to sell it. Now, say you have a pig eight weeks old. This pig is worth 6s. The 3 gallons of milk per day, with the addition of a little green feed off the farm, will keep him until he is seven months old; he should then weigh from 110 lb. to 120 lb. At 3d. per lb. at the factory, this will give you £1 for the milk used. But the pig must always be well fed and kept growing to make him pay, which a pig once stunted will not do. But to return to the calves (the future cows), as I said before, they should be well fed, and besides their skim milk they should have a

little feed as soon as they will eat it, a little hay, chaff, or green feed, and when weaned, if possible, they should be put into a secure paddock to come in with their first calf at three years old. One-half the cattle are spoiled through coming in too young, which makes them stunted, miserable, little things instead of large roomy cows. Now, the treatment of the heifer with her first calf is very important. A little time and petting when she is first bailed up is time well spent. The more gently you break her in, the better cow will she make; and if she is a hand-fed calf and from quiet stock she will give very little trouble. In fact, out of my own herd there are only two cows that I have to put into the bail. All the others are milked in the yard. The heifers are taught to stand very easily. First, you want a small yard with a gate to your bailing-shed. This small yard prevents the other cows from being excited. Now teach your cow to bail up, and as soon as she is quiet, which is often within a week, then teach her to stand outside. Shut your bail gate so that she cannot get in. She will then go to the gate, and, with a little petting, she will soon let you milk her, once she knows what you want, and most of them learn very soon. After this you can milk them anywhere; in fact, a good many of them know if you miss their turn, and will run after their milker to be milked. Sometimes there are timid cows that will have to be milked in the shed for several months; but try them outside, and they will soon stand. When you break them in this way, and when once they are in the yard, you have nothing to do but sit down and milk; and, not having to move them, they get so quiet that a stranger can walk about amongst them in the yard, and even sit down and milk them. This is a great advantage, as it saves time. Now, milking has a great deal to do with making a good cow. The quicker you can milk a cow the more she will give, because she gives it down more freely. When you once sit down to the cow, do so with the intention of getting as much milk as you can, and as quickly as you can, and milk clean if you want your cow to milk for a long time. Always have a bowl of clean water in the yard. Each milker should have a damp cloth with which to rub, not only the teats, but all over where the bits will fall into the bucket; also, be careful to set your receiving cans where the cows will not be able to kick the dirt into them. Cleanliness is the art of making good butter to a large extent, and if the milkman does not keep his milk clean the dairymaid will never make first-class butter. Within the last ten years there has been a great improvement in the quality of butter, yet there is still room for improvement with a good many, for I often see butter put on the market now which is not first-class. This is often caused by churning, marking, and sending the butter to market on the same day. In hot weather the cream should be cooled as much as possible. Churn early in the morning, wash and salt your butter, then let it stand until the next morning before marking. If placed out in the night-air it will get nice and firm. After it is marked let it stand for another night to get firm before packing; then your butter will be freer from buttermilk, will be of a better colour, and will keep firm longer.

Biggenden has so far not been well represented with bacon at our shows; so I will give a few hints on bacon-curing as practised by myself. Cut up your pigs as nicely as you can, then use 1 oz. each of saltpetre and common soda to every 14 lb. of pork. Rub well with this first, then rub in as much salt as the meat will take; rub well for the first three days and turn, putting the top to the bottom each time. After this, rub and turn occasionally during a period of from three to four weeks; then wash off all the salt, hang up to drain until next day, then hang up in the smoke-house. This can be made of slabs 7 or 8 feet high. Fit the slabs as closely as you can, dig out a trench from the middle of the house to about 8 feet outside, and make your fire as far from the house as you can; cover over with a sheet of iron. Corn cobs are good material for fuel, as they make a nice clean smoke, and it is smoke you require. Be careful you do not get too much heat. When the meat is smoked up to the colour you require, take it out and rub well. To give a bright, clean appearance, rub with salad

oil or lard. Bacon cured in this way is sweet and has a good flavour. The use of the soda is to counteract the hardness of the lean meat caused by the saltpetre. If all the above directions are followed, I think it will be found that dairying is not only a pleasant occupation, but also a good paying branch of farming.

TABLE SHOWING AMOUNT OF BUTTER FROM THE FIRST THREE COWS—
ONE DAY'S MILKING.

	lb.
Biggenden, June, 1900—	
Primrose	1,614
Lady	1,380
Victoria	1,343
Total	4,337
Mackay, June, 1900—	
Betsy	1,390
Lilly	1,007
Strawberry	1,039
Total	3,436
Maryborough, July, 1900—	
Daisy	1,610
Lady	1,392
Victoria	1,326
Total	4,328
Brisbane, August, 1900—	
Mona	1,737
Nellie	1,060
Murphy	1,027
Total	3,824
Beenleigh, September, 1900—	
Violet...	1,288
Marguerite	1,269
Spot	1,164
Total	3,721

In 1895 (the first year of the drought) I lost twelve of my best cows out of thirty-two, but the remainder struggled through, although the year 1896 was very little better, as you will see by the amount of milk and butter per cow in the list. This shows how we are fixed, and what we may expect in time of drought if we have no fodder to fall back upon.

Average quantities of milk and butter per cow.

Year.	Milk. Gallons.	Butter. Lb.	Year.	Milk. Gallons.	Butter. Lb.
1893	253	71	1897	353	140
1894	261	100	1898	358	153
1895	241	74	1899	360	155
1896	209	87			

The reading of the above paper was followed by an interesting and animated discussion, in which Messrs. Vance, Kimber, Jones, Nott, Vaughan, and others took part.

Mr. E. Redmond gave an interesting account of his observations on the comparative value of the different breeds of milch cows in use at the Gatton College, and on the experiments carried on there with various feeds.

In reply to questions, Mr. Fowler said he would have liked to start his herd with shorthorns had he found then a milking strain of the breed. In the present state of our breeds he had found nothing yet to beat the Jersey. He preferred a medium-sized cow—and shunned carefully any cow with a tendency to turn her feed into fat. As a green feed, barley had given him the best results.

Mr. Jones said that, as summer feed, he had obtained the best results from panicum or setaria.

In moving a hearty vote of thanks to the lecturer for his valuable paper, Mr. Tardent drew a humorous comparison between dairying as he saw it carried on on his arrival in the colony, some ten or twelve years ago, and the way it was now carried on on rational and scientific methods by men like Mr. Fowler and other progressive farmers throughout Queensland. He was sure dairying had an immense future in Queensland, and a lecture like the one we had heard to-night should induce everyone to put his shoulder to the wheel and help to push the industry along.

SOME NOTABLE PIGS.

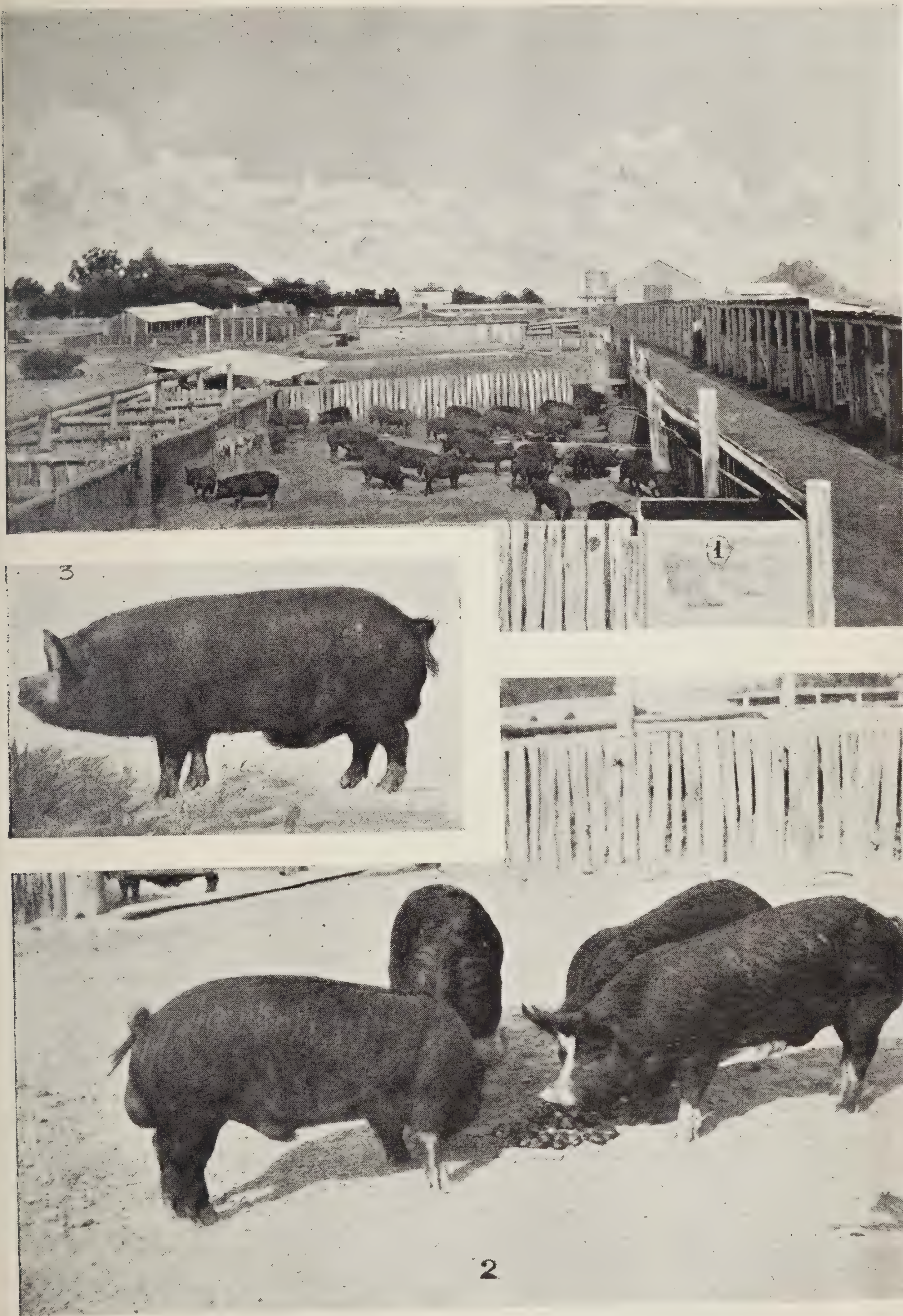
Pigbreeding in Queensland has attained much prominence during the past few years, and is rapidly becoming one of our chief industries, and we are pleased to note the various studmasters recognising the importance of keeping themselves well abreast of the times in having the best and most suitable pigs for producing stock best adapted for the ham and bacon trade, and with that end in view we note the arrival from England of some high-class Berkshires recently imported by Messrs. Baynes Bros. for their well-known stud.

About twenty-five years ago the late Mr. William Baynes imported some Berkshires from England, and at the same time procured some high-class pigs from the southern colonies. The descendants of these pigs have been distributed throughout the colony, and have given every satisfaction. The stud has been kept up to a high standard by the importation of stock from time to time from England and elsewhere.

There has been much discussion among pigbreeders of late, some favouring Tamworth and Yorkshires and the various crosses with the Berkshire, but after years of experience the Messrs. Baynes are of the opinion that the Berkshire is the most suitable for our climate. They would not advise anyone to breed Yorkshires, as they are assured that they will not prove a success.

The stud pig farm of Messrs. Baynes Bros. is situated at Belmont, about 7 miles from Brisbane, on the old Cleveland road. The site chosen is admirably suited for the purpose. The styes, numbering from about eighty to a hundred, are on an eminence affording good drainage, and are constructed on three sides of a square for convenience of handling, feeding, &c. Each sty is about 8 feet square, well floored with hardwood, and is thoroughly cleaned each day. In the centre are the cooking boilers substantially set in brick, where all the food given to the pigs is well cooked before feeding. The food consists of maize, pollard, brewers' grain, barley, sweet potatoes, and pumpkins, which, mixed with fresh ox livers, makes a very fine food. The brewers' grain is given chiefly to the sows, as they are good milk-producing food. Adjoining the styes are yards for the weaners, slips, &c., and for boars who are resting, each of these being provided with good shelter sheds. Beyond these yards are paddocks where the pigs are allowed to run, and when the grass disappears a supply of greenstuff is given. The pigs in all parts of the farm have a plentiful supply of good clean water, which is most essential for successful breeding of pigs. The water for the styes is supplied from the creek by a steam pump, and is laid on to convenient spots.

Plate LXIX.



1. General View of Belmont Piggeries.
2. Group of young Berkshire Boars, under six months, bred by Tenterfield, from imported stock
3. Windsor Duke.

Plate LXX.

Berkshire Boars and Sows at Belmont.

4. Belmont. 5. Belmont Pride. 6. Belmont Beauty.

It is worthy of note that the inspector under the Meat Export Encouragement Act, when reporting upon Messrs. Baynes Bros.' pigs killed under his supervision, stated that they were absolutely free from disease, which shows that the pigs receive every attention and are kept in a healthy condition.

Messrs. Baynes Bros. are at present erecting new styes and yards to facilitate the increase of a greater number of pigs being raised. There are now from 1,500 to 2,000 pigs at Belmont.

At one time the demand was for fat bacon, but now the taste has changed, and breeders are now endeavouring to produce flesh instead of fat, but at the same time it must be streaky. The Berkshires fill the bill, as they have great length between the shoulders and hams, deep on the ribs and light on shoulders, while the loin is broad and hams square, thick, and well-fleshed right down to the hocks.

The following is a short description of the pigs recently imported by Messrs. Baynes Bros. of Brisbane, and illustrated in this issue of the *Journal.* They consist of three boars, and two sows, and were selected in England by Mr. Tate, the manager of Her Majesty's stud farm at Windsor.

The first under notice is Windsor Duke, a magnificent specimen of the Berkshire. He is by Swansea from Windsor Beauty, and was farrowed in May, 1899; consequently is quite a young pig with all his work before him. This pig is perhaps one of the best grown pigs ever seen in Queensland, possessing great length, and with splendid hams well let down, and having all the characteristics of a high-class stud boar.

The two other boars are of somewhat different type, and are both bred by Mr. Burbridge, of Illraxhall, England. The older of the two has been named Belmont, and is a grand pig, though not so massive as Windsor Duke, but is, in the opinion of many, quite equal to his aristocratic mate. He was farrowed on June 11th, 1899, and is by Rightaway from Maid of Waiting. The younger boar, Britisher, is built on somewhat finer lines than the other two, but is nevertheless a very handsome pig, being by Rightaway from Stillroom Maid, and was farrowed on 30th September, 1899, consequently is the youngest of the trio.

These pigs should soon make a name for themselves, as they will be at once mated with some high-class sows locally bred, but from some of the best strains procurable from New Zealand and the southern colonies, notably from the studs of Messrs. Rowe and Angas.

We now come to the two sows, Belmont Pride and Belmont Beauty, bred by the Earl of Carnarvon. These two are litter sisters, and are, without doubt, two of the finest pigs in Queensland, possessing all the qualities of the highest class Berkshires, which, for perfect symmetry, combining all the most valuable points of the breed, could not be surpassed by any pigs imported into Queensland. They are by the Earl of Carnarvon's famous stud boar Jack of All Trades from Flirtaway, and farrowed 2nd June, 1899, and are like the boars entered in the British Berkshire Society's herd book.

This lot, together with the many high-class stud pigs now at Messrs. Baynes Bros.' farm, will go far to improve the breed of the pigs of this colony.

THE LONDON BUTTER MARKET.

The coming export season should offer bright prospects to dairy farmers, provided they are alive to their own interests, and steadily set about the improvement of their herds, culling out all unprofitable cows, and putting in their places high-class animals with a good milking record. The introduction of good stock means a corresponding descrease in the cost of production of butter and a higher price for the product. There is room in England for almost unlimited supplies of first-grade butter, and, judging from the reports of increased prices for cheese, it is pretty well certain that the two colonies which

furnish the London market with that commodity—Canada and New Zealand—will practically confine their attention to cheese manufacture, thus easing the London butter market. Denmark receives annually for her butter a sum equal to 66½ tons of gold worth £4 per oz., yet Danish butter at this moment is in great demand at 120s. per cwt. There is very little likelihood of a fall in the price of first-class butter. Queensland produced during the year ending 30th June, 1900, nearly 6,000,000 lb. of butter, of which 1,159,255 lb. were exported, the value reaching £49,517.

Evidences of improvements in dairy breeds amongst the milking cattle are to be seen in all directions, and these efforts to secure better milking strains will soon make themselves felt in the herds.

Cultivation of food to carry cattle over dry times and to supplement the natural pastures is now recognised as an absolute necessity in dairying, but this is capable of great expansion and has to be carried into effect to a greater extent as closer settlement and the consequent fencing in of paddocks leaves less and less of commonage in which to graze cattle free. Ensilage, cultivated grasses, hay and root crops will all find their place to a greater extent than at present as the industry expands, and the most suitable places for dairying in Queensland will ere long assimilate in their conditions to those now prevailing in Victoria and the south and north coast districts of New South Wales.

The *Montreal Witness* states that Canada is now producing more cheese and reducing the output of butter, and compares the receipt of these two products at Montreal for 1899 and 1900. Last year, to 9th May, there arrived in Montreal 10,888 boxes of cheese and 10,229 packages of butter. This year, during the same period, the total receipts of butter have been 5,946 packages, and of cheese 21,368 boxes. While the receipts of butter have decreased one-half, the receipts of cheese have more than doubled. When reduced to quantity of milk required for production the figures for last year stand at 22,966,000 lb., and for this year at 23,876,000 lb. This shows a small but substantial increase in the production of Canadian dairy herds, and is also proof that the output of Canadian produce, while it may change rapidly from butter to cheese, is a very regular quantity, and that what increase takes place in the future output will be regular and systematic.

IS THE COW IN CALF?

Last month, at Southport, we overheard a conversation between two men, who were looking at a sleepy-looking cow, and debating whether she was in calf or not. The debate ended by both men declaring that no one can tell at an early stage whether that is the case. We have just come across the following test which *Australian Farm and Home* reprints from an American journal, and we give it to our readers for what it is worth. The writer says that his method has not yet failed him. He says:—"The cow to be tested is, of course, milked separately, and as soon as possible after the milk is drawn we dip a straw or Timothy stem in the bucket of milk. Have a glass of pure water at hand, and allow one drop of the milk to fall in the water—only one; if the milk quickly dissipates and renders the water murky, she is not in calf; but, if the milk-drop sinks to the bottom of the glass before mixing with the water, she is pregnant. If you are not sufficiently expert, take the milk of another cow that has newly calved, and pursue the same treatment with both at the same time; and you will not fail to note the difference in the way the drop of milk will mix with the water. I have practised this method of determining pregnancy in my herd for years, and I never knew it to fail. Of course I only speak from my own experience; but the theory is that the milk of a pregnant cow is viscous, or has a sticky, adhesive quality that causes the particles to cohere more closely; consequently, the tendency to drop in a mass instead of mingling immediately with the water. I usually take the morning's milk for the test, and use cistern or rain water if obtainable, or, better still, filtered or boiled water."

TREATMENT OF HOG CHOLERA AND SWINE FEVER.

Dr. D. E. Salmon, Chief of the United States Bureau of Animal Industry, has lately written a valuable article on the above subject, which we reprint, as it contains much that cannot but prove of great interest and service to pig-breeders in this colony. He says:—

With all diseases of this class prevention is cheaper and in every way more satisfactory than medical treatment. The great aim of the Government and the farmers should be, therefore, to prevent the spread of infectious diseases. Every swine-grower should use the utmost precautions to prevent the introduction of these plagues into his herd. In spite of such preventive measures, many herds will become infected.

Before formulating this treatment, it should be explained that a remedy which will cure every case is not to be expected. Some forms of these diseases are so violent and rapid that the animals are dead almost before they are observed to be sick. Under such conditions, there is not time for the most active remedy to produce a beneficial effect.

In many outbreaks the malady is less virulent, and there is time to treat the animals after they are sick, and also the whole herd after some members of it have shown that they are diseased; the most efficacious formula which has been tried is the following:—

Wood charcoal	1
Sulphur	1
Sodium chloride	2
Sodium carbonate	2
Sodium hyposulphite	2
Sodium sulphate	1
Antimony sulphide (black antimony)	1

These ingredients should be completely pulverised and thoroughly mixed.

The dose of this mixture is a large tablespoonful for each 200 lb. weight of hogs to be treated, and it should be given only once a day. When hogs are affected with these diseases they should not be fed on corn alone, but have, at least once a day, soft feed, made of bran and middlings, or middlings and corn meal or ground oats, corn, or crushed wheat, with hot water, and then stirring into this the proper quantity of the medicine. Hogs are fond of this mixture; it increases their appetite, and when they once taste of food with which it has been mixed they will eat it, though nothing else would tempt them.

Animals that are very sick and that will not come to the feed should be drenched with the medicine shaken up with water. Do not turn the hog on its back to drench it, but pull the cheek away from the teeth so as to form a pouch into which the medicine may be slowly poured. It will flow from the cheek into the mouth, and when the hog finds out what it is it will stop squealing and swallow. In many of our experiments hogs which were so sick that they would eat nothing, have commenced to eat very soon after getting a dose of the remedy, and have steadily improved until they appeared perfectly well. This is particularly the case when the disease is hog cholera.

This medicine may be also used as a preventive of these diseases, and for this purpose should be put in the feed of the whole herd.

In treating hogs for these diseases, it must not be forgotten that in nearly all cases there is more or less inflammation of the internal organs, and particularly of the stomach and intestines. To treat such diseases successfully, the animals should be kept dry and comfortable. The food must be such as can be digested by the irritated and inflamed organs. When the hogs are first found to be affected with hog cholera, or swine plague, the lot or pens where they have been confined should be disinfected by dusting plentifully with air-slaked lime, or by sprinkling with a 5 per cent. solution of crude carbolic acid.

The animals should then all be moved to new quarters. If possible, the sick and apparently well should be separated before they are moved and then put

into different lots. This is not essential, but it is an aid to the treatment. The hogs should be kept in dry lots, or pens, where there is no mud, and, above all, no stagnant water. It is well to keep these lots disinfected by the free use of air-slaked lime.

It is not expected by this supplementary treatment that the hogs will be entirely removed from the influence and attacks of germs. That is not necessary. The number of germs which gain access to their bodies may be so reduced by following this plan, however, that the vital force of the system, assisted by the medicine, is sufficient to overcome them.

During this treatment the hogs gain a marked degree of immunity. No doubt this is the result of attacks of the disease from which they recover. This recovery, in spite of the continued infection of the premises, and even though the hogs which have gone through the outbreak are apparently well and thriving, new hogs added to the herd are liable to be attacked. For this reason, five or six months should be allowed to pass before any new hogs are purchased and brought on the premises or before any are sold to be put among other lots of hogs. Young pigs born under such conditions in some cases are liable to resist the infection while in other cases they may suffer severely or die.

If any hogs die during the progress of the outbreak their carcases should be immediately burned or deeply buried, and the places where they have lain or the ground over which they are dragged should be disinfected with carbolic acid or lime, according to the method already mentioned.

INSPECTING DAIRIES.

The Dairy Bureau of Massachusetts recommends the following scale of points for inspecting dairies:—Condition of cows, health, 6; cleanliness, 6; stables, clean, 4; light, 5; good ventilation, 5; disinfected twice a year, 4; yards, dry, 5; feed, 10; water, 5; care of milk, handling, straining, 6; submerging, 6; apparatus thoroughly washed, 4; scalded, 4; exposed to sunlight, 4; location of cream room, dry, 2; free from odour, 4; ventilation, 3; care of tank, clean, 3; pure water, 7; temperature, 7. Total, 100.

A SIMPLE CHEESE PRESS.

Because of the fancied difficulty in the cheese-making process but few women think of attempting it. When a certain routine is followed, it is easy enough, and the "plant" required is so simple and inexpensive that no one need be deterred on that score (says a writer in the *American Agriculturist*). The requisites are a good boiler, a dairy thermometer, a triplex or quadruple chopper, a chopping board, a couple of colanders, a home-made cheese press (which can be made from a new coal oil can, a 3 feet board, and a 2 by 4 scantling 5 feet long), a bottle of cheese-colouring fluid, some liquid rennet and cheese cloth.

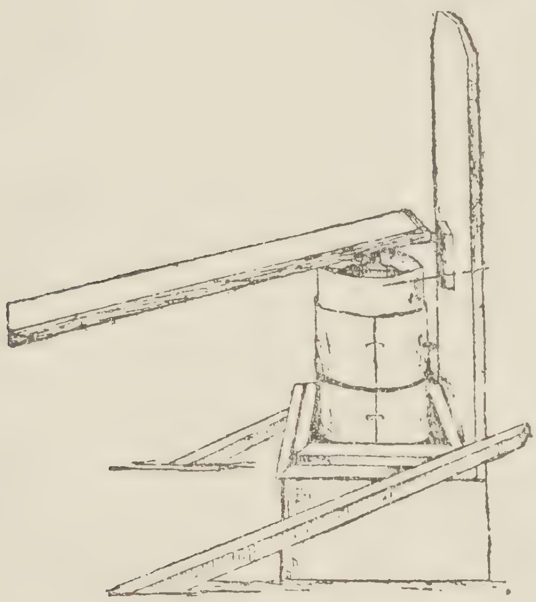
I have made an occasional cheese throughout the year, and enough in the spring and summer to go a great way towards paying the grocery bill. Three milkings may be used in winter, and two in summer. Care must be taken to cool the fresh milk before adding it to the other.

Place your double boiler on the back of the stove, the inner one resting on something, and put in the milk. Pour warm water into the outer boiler and bring the milk to 82 degrees. For from 5 gallons to 7 gallons of milk, add about half a teaspoonful of the colouring fluid and half that quantity of rennet, previously mixed with a little water. Stir thoroughly and leave it to coagulate at the same temperature.

When the curd will break off clean from the bottom of your finger it is time to cut. A long carving knife, or anything that will reach down to the bottom of the pan, will do. Cut each way, leaving about 1 inch between

the cuts. The heat may now be raised gradually about 2 degrees every five minutes to 98 degrees. Begin in a few minutes by shaking the boiler to help the flying off of the whey, but gently, so that the fat does not escape. Presently stir, and repeat the stirring every two or three minutes. In about an-hour the desired temperature ought to be reached. The curd will soon be reached. The curd will soon be half its size, and when pressed between the finger and thumb the clots do not stick together. It is now time to take off half of the whey. The approved vat has a tap, but it is quite easy to take off part with a dipper when the curd has settled. Leave it covered an inch or two, that it may develop more lactic acid, and the curd mat together, after which remove it from the remaining whey.

At this point, I take up the inner boiler and place the curd in the two colanders, leaving it there to drip into the large boiler. This, the cheddaring



process, goes on at 90 degrees. Occasionally change the bottom of the curd to the top. When cheddared, instead of a tough, spongy mass, the curd is the texture of cooked, lean meat—elastic and fibrous.

Curd mills are used for preparing the curd for salting, but in small quantities it is quite quickly cut with one of the new choppers and chopping board. It should not be cut fine, but of as uniform a size as possible, so as to receive the salt evenly, and as near the temperature of 90 degrees as possible. About the same quantity of salt is required for cheese as for butter.

When the heat is lowered to 78 degrees it is ready for the press. At a higher point the fat is liable to escape, and if too cold the curd particles do not adhere. Bandages are easy to make of cheese cloth. Sew a strip, the circumference and height of your tin, to a round piece the required size. Another round piece will be needed to lay on the top of the cheese, folding the wall piece down on it.

"TOPPING OFF" PIGS.

A correspondent of a contemporary describes a new method of "topping off" pigs and making the flesh hard instead of flabby. About an hour after the animals have had their usual ration, whatever it may be, give each one a small quantity of dry meal of whatever kind is preferred. It is not to be mixed with any other substance, nor is it to be moistened in any way. The pigs eat it slowly, as they are compelled to do on account of its dryness, and will take a good half-hour to get through a small portion. The effect of this dry ration, eaten by itself about an hour after the usual feed, is to impart a firmness to the flesh which is difficult to obtain by any other method of feeding. The pigs appear also to enjoy the dry meal thoroughly.—*Australasian.*

DAIRY HERD.

QUEENSLAND AGRICULTURAL COLLEGE.

Returns from 1st to 31st October, 1900.

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.			
Blink ...	Ayrshire	21 Mar., 1900	541	3·9	23·63	
Bonnie ...	,, ...	17 April ,,	222	3·7	9·19	Dry, 31-10-00
Laverock ...	,, ...	7 Dec., 1899	172	3·7	7·12	Dry, 27-10-00
Linnet ...	,, ...	15 May, 1900	690	3·6	27·82	
Lavina ...	,, ...	6 April ,,	695	3·6	28·02	
Rosebud ...	,, ...	10 April ,,	811	3·5	31·79	
Annie Laurie*	,, ...	30 May ,,	895	3·9	39·09	
Ream ...	,, ...	24 July ,,	804	3·8	34·21	
Isabelle ...	,, ...	7 July ,,	683	3·9	29·83	
Lena ...	,, ...	13 July ,,	785	3·7	32·53	
Laura ...	,, ...	28 Aug. ,,	571	3·8	24·3	With first calf
Leesome* ...	,, ...	1 Sept. ,,	985	3·7	40·81	
Ream Routhie	,, ...	20 Sept. ,,	847	3·9	36·99	
Annie ...	,, ...	8 Oct. ,,	422	3·4	16·06	With first calf
Jersey Belle	Jersey	21 May ,,	624	5·6	39·13	
Content* ...	,, ...	18 July ,,	677	4·5	34·12	
Playful* ...	,, (Grade)	14 July ,,	742	4·6	38·22	
Baroness ...	,, ...	3 Aug. ,,	636	5·0	35·61	
Carrie ...	,, ...	18 Aug. ,,	541	4·2	25·44	With first calf
Spec ...	,, ...	26 Aug. ,,	487	4·4	23·99	With first calf
Stumpy* ...	,, ...	29 Aug. ,,	913	4·5	45·11	
Eveleen ...	,, ...	2 Sept. ,,	675	4·3	32·5	
Beatrice ...	,, ...	3 Sept. ,,	446	4·7	23·47	
Connie ...	,, ...	8 Sept. ,,	660	4·1	30·30	
Ivy ...	,, ...	28 Aug. ,,	546	4·1	25·07	
Russet ...	Grade Shorthorn	7 Oct. ,,	334	3·8	14·21	
Alice ...	,, ,, ...	13 Nov., 1899	110	3·6	4·43	Dry, 16-10-00
Eva ...	,, ,, ...	18 May, 1900	557	3·8	23·70	
Polly ...	,, ,, ...	29 Jan. ,,	426	3·8	18·13	
Rusty ...	,, ,, ...	17 Jan. ,,	142	3·6	5·72	Dry, 26-10-00
Stranger ...	,, ,, ...	7 July, ,,	788	3·7	32·65	
Ball ...	,, ,, ...	14 Aug. ,,	674	3·5	26·42	
Duchess ...	,, ,, ...	24 Aug. ,,	719	3·8	30·60	
Restless ...	,, ,, ...	3 Sept. ,,	795	3·6	32·05	
Rosella ...	,, ,, ...	5 Sept. ,,	817	3·6	32·94	
Lucy ...	,, ,, ...	27 Sept. ,,	884	3·9	38·61	
Leopard ...	,, ,, ...	29 Sept. ,,	791	3·7	32·77	
Redmond ...	,, ,, ...	12 Sept. ,,	825	3·8	35·11	
Pet ...	Grade Jersey ...	14 Aug. ,,	580	3·8	24·68	
Fancy ...	South Coast ...	21 May ,,	664	3·8	28·25	
Damsel ...	Holstein ...	5 Dec., 1899	126	3·5	4·93	Dry, 26-10-00
Dairymaid	,, ...	15 May, 1900	758	3·2	27·16	
Violet ...	Shorthorn ...	9 Oct. ,,	420	3·4	15·99	
Cherry ...	,, ...	19 Feb. ,,	331	3·8	14·08	
Gladdy ...	,, ...	2 May ,,	698	3·7	28·92	
Hilda ...	,, ...	25 May ,,	351	3·9	15·33	
Louisa ...	,, ...	6 April ,,	680	3·7	28·17	
May ...	,, ...	20 May ,,	544	3·8	23·15	
Nestor ...	,, ...	21 April ,,	523	3·9	22·84	
Folly ...	,, ...	15 May ,,	176	4·1	8·08	Dry, 31-10-00
Spot ...	,, ...	11 Sept. ,,	714	3·6	28·78	
Kit ...	,, ...	28 Sept. ,,	793	3·8	33·75	
Brush ...	,, ...	28 Sept. ,,	328	3·8	13·95	
Plover ...	,, ...	3 July ,,	788	3·7	32·65	
Guinea ...	,, ...	20 Feb. ,,	511	3·6	20·60	
Queenie ...	,, ...	29 April ,,	598	3·6	24·11	
Frizzy ...	,, ...	23 Aug. ,,	712	3·8	30·30	
Maggie ...	,, ...	20 June ,,	444	3·6	17·90	
Laurel ...	,, ...	10 Sept. ,,	780	3·6	31·44	

The whole of the herd, with the exception of those marked *, were fed on natural pasturage. Cows marked * are being fed for experiment purposes.

The Horse.

HORSE-BREEDING.

As the subject of horse-breeding is deservedly attracting much attention at the present time, the following extract from an article which appeared in the *Pastoralist Review*, of New South Wales, is well worth reproduction. The article in question was written by Mr. Vincent J. Dowling, of Lue, New South Wales, one of the best authorities on the subject in that colony :—

There are many theoretical horse-breeders, but very few practical men who have spent the greater part of a lifetime at the business. The latter find, when very near the close of life, that they are just beginning to have some idea of the best method of procedure. Valuable experience can only be gained by close attention and many experiments. Select sires and dams as thoroughbred as possible for breeding purposes, then go on selecting your best again and again for whatever purposes you may require horses—whether they be race-horses, carriage horses, hacks, cavalry chargers, or trotters. By selection you can breed up to anything, and have the very best of its kind. For instance, you can breed a trotter that will last a day, and not curl up at the end of 25 miles, as most of the so-called trotting horses of the present day, bred from English hackneys, or English and American trotting sires, are inclined to do. It is well known that many of the best and fastest trotters in olden times were quite thoroughbred. The best horses I have ever ridden or driven—either long journeys, after stock, on camp, up or down mountains, through the roughest and most scrubby country, over fences, or hunting—have been, if not altogether thoroughbred, possessed of a good deal of blood, or have been thoroughbreds combined with a distinct Arab strain.

I have, of course, ridden and driven a very large number of horses bred anyhow, many of them pleasant and good while they lasted; but when it has come to real life or death work they will not stand. Their bottom is not deep, and may easily be found, while a thoroughbred is like deep ground—a long way to the rock. It is a fact well known to all old breeders that when we are nearer back to the original importations of thoroughbred sires and dams, brought from England, or Arabs from India, it was almost exceptional to find either a really bad-looking horse or a bad performer. The reverse is now the case, and the country is full of rubbish. The fastest and most enduring horses I have ever ridden have invariably been small horses. I have certainly ridden some good, grand-looking large horses, but they never lasted with constant hard work; their own action and weight always told in the end; their legs generally crack up, but if well bred their heart never goes, and is too good for their legs. Nothing can be compared to the thoroughbred or Arab, crossed on to the right sort of thoroughbred mare. They are not all good hacks, probably, but there is no doubt about their gameness or power of endurance. They will simply go till they drop, if called upon to do so. Horses bred anyhow are not reliable.

I am quite convinced that nothing less than a good, fair tax on stallions will cause a noticeable and necessary improvement in the breed of horses throughout the colonies. It would practically place the breeding of horses in the hands generally of competent men—good judges—who would at least know the breeding, qualities, and shape of a good useful sire; and this would be a great deal gained, as it would have a beneficial effect on the mares also. If a tax on stallions came into force, breeders would become educated to the fact that one good colt or filly is worth three or four indifferent ones, and we all know that a good horse does not eat, at any rate, more than a bad one. As a matter of fact, all the food eaten by three or four head of rubbish could be put into the good one with infinitely better results. A man who preserves his

proved good old mares, and sends them to good thoroughbred horses, and who is willing to pay the tax on stallions, must in the end materially benefit and get good stock.

One of the most important factors in the breeding of horses is the possession of suitable country. A limestone country of good quality is certainly the best. I do not mean by this the limestone country of the west, but undulating, or even mountainous country, with a fair proportion of stones and good flats. The stones are necessary to give horses good feet, while the act of ascending or descending hills or mountains develops the muscles of the thighs, loins, and backs. Horses bred on perfectly level country, however good, can never develop like those bred in hilly limestone country. They are inclined to be flat-footed and slack-thighed, and when they come into the trainer's hands and are put to ordinary work their feet are always a source of trouble. If a man desires to start breeding horses on a large scale, he must first of all fix his type, and select his horses and mares accordingly. For the purpose of breeding the most useful kind of animal for general purposes, it would be very necessary to be particular in the selection of mares, and every one knows how difficult it is to obtain for such services good, sound, short-legged, well-made mares, if possible with good known performances, either for endurance or speed. The sire should be selected on the same lines, and the results carefully watched. Unless the sire has proved himself beforehand as a first-class stock-getter, it is impossible to say what his stock will be like, no matter how good the mares may be; but if the horse has been a pronounced success, his progeny out of such mares as I have mentioned cannot be a failure. I am a great believer in the Arab strain, provided the sire is a pure Arab, and not a Persian Gulfer, or what is termed a "country bred" in India. Numbers of animals are sent down here for sale as Arabs which are not pure, and therefore great care is necessary in selecting animals to see that they are first-class. A good Arab sire is sure to get something fairly good out of anything, and if strong, compact, roomy thoroughbred mares are put to such horses the result must be satisfactory. The stock will be of good size, showing abundance of quality, with wonderful powers of endurance, and be fit for almost any kind of work. Again, a very desirable class of animal for country, town, or station work, may be produced by the Arab from carefully-selected, good, stout mares, without much breeding, suitable for spring-cart work, and although it may seem strange and be too great a wrench, it is beyond doubt a fact that Arabs on heavy draught mares will even produce most valuable horses, suitable as gunners or for work of a similar character.

THREE GOOD RECIPES.

The following are three good veterinary formulæ, which stockmen should keep by them:—The first is known as Sherwood's rubbing liniment, and consists of gum camphor, 3 oz.; tincture of cantharides, 3 oz.; tincture of capsicum, 3 oz.; alcohol, 1 pint; and tincture of arnica, 1½ pints. For gasoline liniment, take alcohol, ½-pint; gasoline, ½-pint; tincture of arnica, ½-pint; and tincture of iodine, 4 oz. For leg lotion, take corrosive sublimate, 1 oz.; muriate of ammonia, 2 oz.; acetate of lead, 3 oz.; sulphate of copper, 2 oz.; ether, 2 oz.; alcohol, ½-pint; and water, 1½ gallons. These three formulæ are in constant use in one of the Eastern hunt clubs for hunters and polo ponies. The first two are stimulating rubbing liniments for lameness and soreness, the second formula being the stronger of the two. The third, the leg lotion, is an astringent, antiseptic wash, applied to hunters, polo ponies, and racehorses after a hard run or race. It is used for the purpose of hardening the legs, and preventing "stocking up," or swelling of the legs after a hard go, and also to quickly heal up all scratches, cuts, and abrasions that may have been incurred during the run.—*American Druggist.*

Poultry.

MECHANICAL OPENING FOR FOWL-HOUSE DOOR.

Mr. Herbert Simpson, of Maryborough, sends us the accompanying sketch and description of an ingenious device for a self-opening door for fowl-houses, and also of a simple set of portable roosts. It sometimes occurs that, when poultry are shut up in the house for the night, the owner attends to some other business in the early morning, and forgets the birds in the meanwhile. By Mr. Simpson's device they would not suffer from this neglect, as all they need do is to walk up to the door, which would at once fly open by its own action. Our correspondent states that he uses it himself with great success on his poultry house, and describes it thus:—

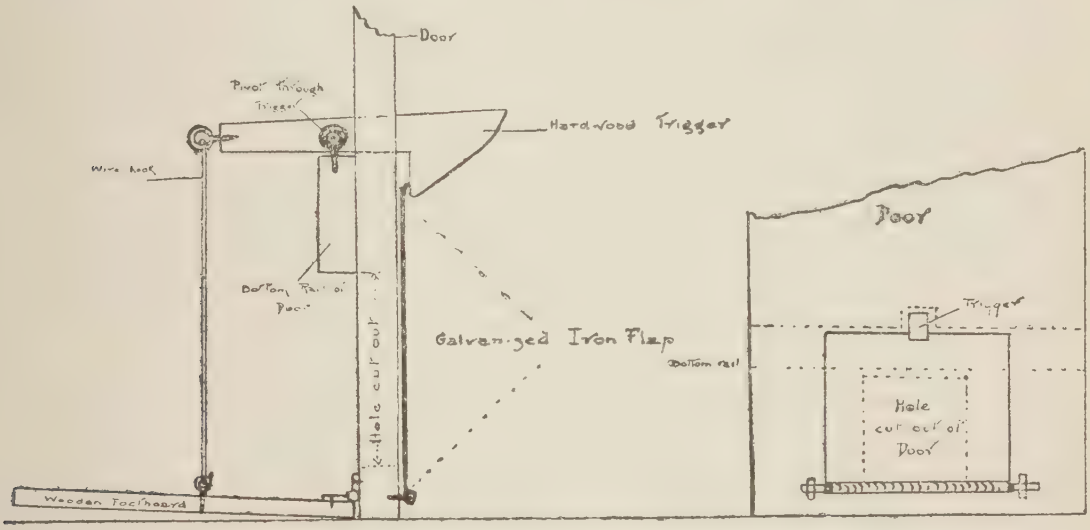


Figure 1.

Fig. 1 shows a trap fixed on door for letting out hens in the early morning, and I have never once known it to fail in doing this. As a rule, hens crowd at the door of a poultry-house long before it is opened. By this means they let themselves out. The main thing to be observed in fixing this trap is to see that the thick end of trigger is heavy enough to balance the footboard. If not heavy enough, put a weight on; an old nut answers the purpose admirably. The footboard should be high enough so as not to interfere with opening and shutting of door. Any handy man could fit this arrangement in about an hour, and as nothing can get in from the outside, and your hens are out and picking at peep of dawn, besides other convenience it affords, I think the hour and the few pence are well spent.

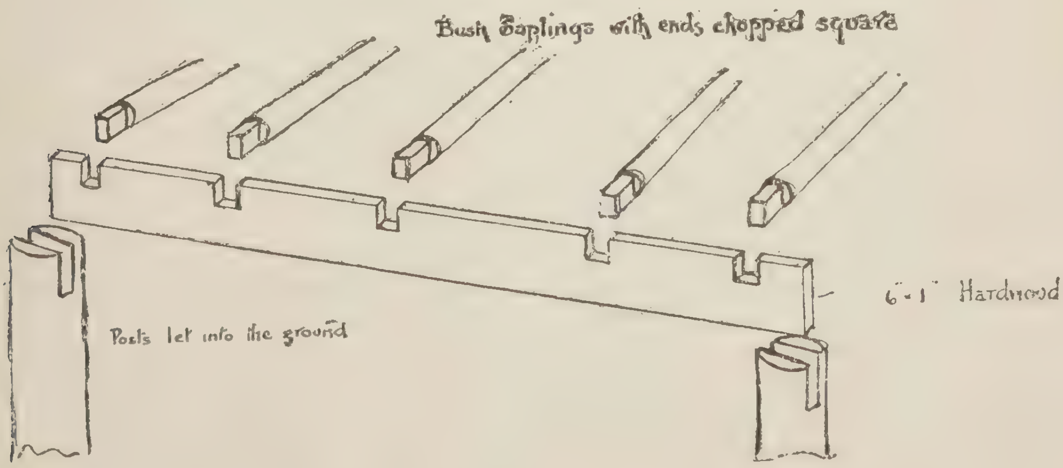


Figure 2.

Fig. 2.—Roosts so arranged can be taken to pieces in a few minutes, leaving the whole fowl-house ready for cleaning. The roosts and bearers can then be painted with kerosene, and put back. It also shows how roosts can be easily fixed all on one level, which should be from 2 feet to 2 feet 6 inches from the ground.

INTERESTING EXPERIMENTS WITH HENS.

This is no longer an age of "guessing" but one of correct experimentation and practical facts. The only defect about experiments is, there are not enough made. The Utah experiment station has done a work upon poultry the results of which we are glad to lay before the readers of the *Agriculturist* as follows:—

1. What is the most profitable age of the hen? Two pens of Leghorns averaged 175 eggs per fowl during the first year. During the second year the same fowls averaged 132; and during the third year, 116 eggs per fowl. The per cent. profit on food was 188 the first year, 118 the second, and 97 the third year. A test with two other pens of Leghorns gave the following results:—First year, number of eggs laid, 159; second year, 119. Per cent. profit on food, first year, 184; second year, 99.

2. What is the effect of exercise on egg production? The result for three years are in favour of feeding grain in a box against feeding it in straw and making the hens scratch it out. One pen with all grain fed in a box averaged 147 eggs per fowl for three years. A like pen having the grain fed in a litter of straw averaged 132 eggs. During first year, as pullets, the results were in favour of the exercise, the pen fed in a box averaging 158 eggs per fowl, against 182 for the pen fed in the straw. These results were secured with Leghorns. With two other pens of Leghorns, during the first year, as pullets, the pen with "exercise" laid 160 eggs, and the pen with "no exercise" 157 eggs. During the second year, the "exercise" pen laid 119, and the "no exercise" pen 120, the results for the two years being practically the same for those two pens.

3. As to the effect of exercise on food consumption, the average of pens 3 and 4 for three years shows that the pen "with exercise" consumed 62·4 cents' worth of food, and the pen "without exercise" 60·8. In the case of two other pens the average was 63·5 cents and 62 cents respectively per fowls in favour of "no exercise."

4. During the year the Leghorns consumed an average of 62 cents' worth of food per fowl. The Wyandotts consumed 81·6 cents per fowl, and two pens of Plymouth Rocks averaged 87·7 cents per fowl.

5. The Leghorns consumed during the year an average of 75 lb. of total food or about 55 lb. of dry matter per fowl; the Wyandotts, 100 lb. total food, 73 lb. dry matter; and the Plymouth Rocks about 110 lb. total food and about 80 lb. dry matter.

6. The three years' results from Leghorn pullets show an average of 162 eggs per fowl per year, at a food cost of 4·6 cents per dozen. These results are not from selected or pedigree layers.

7. The record of weight of fowls shows that Leghorns weigh about 10 per cent. more during their second year than during the first year as pullets. During the third year there is practically no increase in weight.

8. The largest egg production was during the period of greatest food consumption. The smallest egg yield was when the food consumption was least. The hens attained their greatest weight immediately preceding the periods of greatest egg production. After the periods of heavy laying they showed a loss of weight.

9. Five pens of Leghorns two and three years old laid eggs averaging 1·56 lb. per dozen. Five pens of Leghorn pullets laid eggs averaging 1·37 lb. per dozen. The eggs from the pen of Wyandotte pullets averaged 1·56 lb. per dozen, and those laid by four pens of Plymouth Rock pullets averaged 1·52 lb. per dozen.

10. Eggs from different hens of same breed varied in weight. One pen of Leghorns two years old laid eggs averaging 1·45 lb. per dozen. Two other pens of the same age, but of different strain, laid eggs averaging 1·63 lb. per dozen. The eggs from the latter two pens weighed more than those of the Plymouth Rock or Wyandotte pullets.

11. The eggs from five pens of Leghorn pullets averaged 1·14 lb. per dozen. The eggs from the same pens during the second year averaged 1·54 lb. per dozen. In other words, the size of the eggs was 8 per cent. greater the second year.

12. A test of wheat *versus* corn gave results in favour of wheat for egg production.

13. In the case of Leghorn pullets, the addition of dried blood to the ration considerably increased the egg yield. With Plymouth Rock pullets no effect was noticed on the yearly record. With both, the pens having dried blood began laying earlier than the others.

14. The discarding of corn (except the little used in the meal) and substituting a small quantity of sunflower seed did not materially affect the egg yield, there being but a slight increase. Owing to the greater cost of the sunflower seed, the financial results were in favour of the corn.

15. The results of a test with Leghorn pullets showed that a nutritive ratio of 1 : 4·95 was very much superior to one of 1 : 6·66. With Plymouth Rocks the results were conclusive.

16. An initial test with one cockerel and one capon gave no indication of increased growth from the operation of caponising; but the appearance of the dressed bird and the quality of the meat showed a decided advantage from the operation.—*Florida Agriculturist.*

PRESERVING EGGS IN WATER-GLASS.*

In the annual report of the Ontario Agricultural College, Canada, it is stated that eggs were kept in a solution of water-glass, consisting of 1 part semi-fluid water-glass in 20 parts by measure of water, for six months, and were then fit for eating. When preserved eggs are boiled, the shells should be pierced with a needle; otherwise the shells will burst, owing to the expansion of the air inside.

Two points must be borne in mind when making the water-glass pickle: First, the quantity mentioned refers to the semi-fluid form, as thick as treacle, and not to the liquid form, which is considerably weaker. The second is that the pickle is made, as stated above, by adding 20 parts of water to 1 part of water-glass by measure, and not by weight. Thus, a gallon of water will weigh approximately 10 lb., and a gallon of water-glass in semi-fluid form 14 lb. To make the pickle, boil 2 gallons of water, and when cool add 1½ lb. water-glass, stirring it well. The pickle may be placed in receptacles, and the eggs placed in it as obtained. A 4-gallon kerosene tin will hold about 16 dozen to 18 dozen eggs, and will take, say, 1½ gallons of pickle. One gallon of pickle will cost 3d. by getting large quantities of water-glass, and will cover from 10 dozen to 12 dozen eggs; so that it will be seen the cost is very small; in fact, scarcely worth taking into account, when the efficiency of the method is the main point. Probably the water-glass could be used more than once, but being so cheap it is scarcely worth while risking the loss of 10 dozen eggs for the sake of 3d.

There are many different methods of making the lime pickle, but the following will be found very satisfactory:—Slake 3 lb. of fresh lime in 3 gallons water, let stand for twenty-four hours, stirring well occasionally, then, when well settled, draw off the clear liquid, taking care not to disturb the lime sediment, and place in tins or jars, adding 12 oz. salt and 1 oz. cream of tartar.
—*Australian Farm and Home.*

*Water-glass is silicate of soda, and is easily dissolved in water. In Europe it is worth 10s. per cwt. For small quantities in Queensland, the price is about 9d. per lb.—Ed. *Q.A.J.*

THE AUSTRALIAN POULTRY INDUSTRY.

AN ENGLISH EXPERT'S VIEW.

Mr. W. Cook, the English poultry expert, who is at present visiting the Australian colonies, recently said, in the course of an interview with the representative of a Sydney paper, that there never was a time when more interest was taken in poultry in almost every part of the world than at present. England particularly, during the past fifteen or eighteen years, has made wonderful strides in all branches of the art of raising poultry, while America has been going ahead for thirty years. He had heard, since arriving in Sydney, a good deal about England and Australia in rearing poultry? Well, in the first place, the climate of the colonies is more even. In some parts of Britain, though it is only a small island, the temperature varies very much. Some people have an idea that fowls cannot be reared in cold weather, but this is wrong. Practically, they grow faster in cold weather than in hot weather. This is proved in the old country, as in the north of Scotland, where the air is always keen and sharp, and it is never hot, if the same stock birds are bred from, they are found to grow larger than in the south of England. In the south of England they get sharp frosts at night, and the sun very.warm during the day; whereas in the north of England, even if the sun comes out, the air is keen. Cold weather never hurts fowls or chickens. It is the wind and the wet that kills the chickens, and stops the hens from laying. The winters are fairly even, and, though the summer is hot, people know what to expect, and how to make preparation for it. Where the colonies have the advantage is that the seasons are just the opposite to those of the English. They can send their birds to

MARKET IN ENGLAND WHEN POULTRY IS SCARCE

there, and realise from 9d. to 1s. 6d. per head more than at any other time of the year. He had seen very little of New South Wales, but had, however, beheld sufficient to say that there was a grand opening for the rearing of poultry and the production of eggs. There was an immense quantity of timber, and where there is timber and foliage there is always a great amount of insect life. Large places could be utilised in the country for rearing stock and keeping them in health. In the first place, where there is a great deal of timber it breaks the high winds from the fowls. Secondly, it shields them from the sun in summer, and the hot sun kills ten times more chickens throughout the world than the cold does. Fowls must have air, and plenty of it, and this can be got in the colonies. What makes fowls go wrong so quickly is keeping them too warm at night. Even in England, where they have from 18 degrees to 36 degrees of frost, they never think of shutting their poultry shed doors. Speaking of the birds shown at the recent poultry show in Sydney, Mr. Cook said the Leghorns and Minorcas were better than any he had ever seen in the old country, while the Orpington, Wyandotte, Langshans, and Plymouth Rocks were very good. The specimens of English game were fine birds, and he thought that English breeders would soon have to import some of the Australian varieties. Mr. Cook also noticed that the generality of birds were larger than in the mother country. The same remark applied also to ducks, but in neither instance is the flavour impaired. Like other practical men, Mr. Cook seems to think that poultry-farming in New South Wales means money, and, though the Chinese can produce poultry and eggs at a lower price, the Australian poultry-farmer can secure both during those periods of the year when prices are highest.

The Orchard.

SHIPMENT OF ORANGES TO VANCOUVER.

Full particulars, under date of 18th October, of the shipment of 105 cases of oranges made by the Department of Agriculture on behalf of a number of fruit-growers at Buderim Mountain and Woombye, per s.s. "Aorangi," to Vancouver on the 20th of July last, are now to hand from Messrs. Johnson and Burnett, Vancouver, to whom the fruit was consigned.

In a previous communication from this firm, under date of 23rd August, we were informed "that the oranges came to hand in very fair condition, in fact better than most of the Californian fruit, and as regards flavour and quality they appear to be most satisfactory," also that they had sent some of the fruit into the interior as far east as Winnipeg, in Manitoba.

The results of the shipment may be briefly summarised as follows:—

By proceeds received from Johnson and Burnett, Limited, Vancouver, 105 cases oranges		£34 17 8
Less expenses paid by Department of Agriculture—		
Freight, Brisbane to Vancouver...	£10 10 0	
Wrapping paper	1 4 0	
Expenses, packing &c.	2 5 0	
		£13 19 0
Net return of 105 cases, 3s. 11/85d. per case		£20 18 8

This gives a net return of 3s 11/85d. per case for the 105 cases sent. As the fruit was only worth 2s. 6d. per case in the local market at the time the shipment was made, the price obtained is considered satisfactory.

With regard to the loss in repacking Messrs. Johnson and Burnett state: "We may say that the percentage shown in this case is much heavier than would be the case in ordinary shipments, the consignment having been treated as a sample one, with a view to the introduction of the fruit to the market, and consequently the goods were kept in warehouse longer than usual. The rdinary wastage may be set down at 10 per cent. to 12½ per cent."

Messrs. Johnson and Burnett make the following suggestions with regard to future shipments:—

1st.—The sending of small oranges, as small oranges give the retailer a better profit than large.

2nd.—The cases were too heavy; they should be as light as possible, as when shipped from Vancouver to outside points by express, the rate is at per lb., hence extra weight means extra freight.

3rd.—That the oranges be graded in two grades, fancy and choice. Fancy to consist of nothing but clean, thin skin oranges. Choice would admit of the same oranges with a certain percentage of blemishes on the skin, also a rougher skin orange.

4th.—The months in which orange shipments could be made most advantageously to this market are August, September, and October, and in some early seasons July.

Commenting on the above, Mr. A. H. Benson says:—

In my report on the shipment dated 18th July, I called attention to the excessive weight of the cases and stated that I would have preferred pine to hardwood. The cases used were supplied by Mr. Bartholomew, of the Woombye sawmills, free of cost.

With regard to grading, I stated that I was unable to grade for colour and brightness of skin as is desirable, as the fruit was supplied by no less than seventeen growers, each of whom wished his fruit to be kept separate; and when there is only a small number of cases from each particular grower it is impossible to grade both for size and colour, as there is not sufficient fruit for this purpose.

On the whole the shipment is satisfactory, as it shows the possibility of sending our oranges across the tropics as ordinary cargo. It also proves the good keeping qualities of our oranges, as, although they were fully ripe when shipped, they carried well and kept for a considerable time after their arrival.

In future shipments it will be advisable to grade the fruit by machinery for size, and select for colour and thinness of skin, as well as to provide complete arrangements for handling the fruit expeditiously. Central packing-houses will have to be erected; the fruit of a district will have to be shipped under one brand, and be graded for colour, quality, and size.

THE FRUIT FLY.

By A. H. BENSON.

As the season is now approaching in which the fruit fly attacks deciduous fruits, the Department of Agriculture again draws the attention of fruit-growers throughout the colony to the great importance of their at once taking prompt measures to keep the pest in check.

The best means of doing this is the destruction by boiling of all fly-infested fruit in the season, whether same be grown in private gardens, or in the orchards of those who making their living out of fruit-growing. The importance of destroying the earlier crops of larvæ (maggots) cannot be over-estimated, as it prevents to a very large extent the complete infestation and total destruction of all later ripening fruits. The fly (mature insect) is very numerous in the coastal districts now, and is attacking all late oranges, cumquats, lemons, &c., from which, if unchecked, it will spread to the peach and plum crops.

In order to obtain the best results from the destruction of infested fruits, every fruit-grower, whether he owns one tree or a thousand, should do his best to carry out such destructions; as the success to be obtained thereby depends entirely on the thoroughness with which the work is carried out. In addition to the destruction of all infested fruit, it is a good plan for orchardists to have certain trees as traps. It is found that the fly has a preference for certain fruits, or certain trees, and when such is the case it is advisable to allow the flies to attack the fruit of such a tree or trees unmolested; to lay all their eggs and before the larvæ are fully developed to gather and destroy by boiling every fruit in such trees. This, if carefully carried out, will result in the destruction of vast numbers which would otherwise mature and reinfest later crops of all kinds of fruit.

Growers are also warned that they are prohibited from sending infested fruit from district to district within the colony, as such fruit when found will be destroyed forthwith.

All fruit dealers, auctioneers, and retailers are also warned against handling infested fruit, as such, when found, is liable to be destroyed.

The sending of fly-infested fruits early in the season from infested to clean districts is the surest way of establishing the pest, so that growers in such clean districts should make it their business to see that all such importations do not take place; but if they do, to inform the Department of Agriculture.

BLACKBERRIES.

In the old country "going a' black-berrying" is one of the enjoyments of youth. There the blackberries grow luxuriantly, but are kept under perfect control by farmers, gardeners, and in no less degree by the frosts and snows of winter. In this genial climate, however, the blackberry is liable—indeed, certain—to become almost as great a pest as the prickly pear. A correspondent writing from Yandina says:—

Some few years ago I had a few blackberry sets given to me by a neighbour's children, and I thought I had got a pleasant fruit; but now I have discovered that those who plant them in semi-tropical Queensland run the risk of being, in course of time, evicted from their holdings by this same blackberry briar. Once they get a good hold of the soil, they spread out on all sides; and if you cut them down, they will run several feet underground and rise somewhere else. If you dig them out and only one small piece remains, it will root and spread again. After having about a chain square of scrub soil well dug up and thoroughly cleared of blackberries, I have forked it over five or six times carefully, and still find some left. Some of my neighbours who planted the Indian raspberry have had the same tronble.

DAMAGES FOR TREES UNTRUE TO NAME.

The *Alleghany Gazette* (Mich.) reports a case as follows:—After a three-days' trial a case has been concluded in the Kent circuit court which is of much interest to fruitgrowers and nurserymen. It was brought by Peter L. Long against John Pruyn, upon a claim for 2,500 dollars damages. Pruyn sold Long a lot of trees which proved to be not what was represented, and they bore only worthless fruit. The jury gave a verdict of 975 dollars for Long, basing their finding on the comparative value of Long's farm with its worthless trees and what it would be worth were the trees true to name. At least one other such case has been decided against Pruyn.

[We do not know how the law of this colony would deal with a dishonest nurseryman, but we do know from sad experience that we have purchased trees, especially citrus trees, by the hundred from travelling agents, and have had ample reason to regret having done so.—Ed. *Q.A.J.*]

ORANGE-CULTURE IN SOUTH CALIFORNIA.

By D. Wingate.

The following excellent article on citrus fruit culture in California is taken from *Chambers's Journal*, and may *ipso facto* be taken as authoritative. We have frequently been indebted to that journal for reliable information on various subjects, which are obtained from the best sources, and are treated in a manner at once clear and intelligible to all interested in the subjects dealt with:—

The culture of the orange-tree has greatly increased in South California within the last few years, despite the many difficulties the growers have had to contend with. Florida was once the largest orange-producing State in the Union; Riverside, a county in South California, is now the largest orange-producing district in the world. Even Covina, a comparatively new orange-section, also in South California, last season (1899) shipped 100,000 boxes more than the whole State of Florida. Given suitable soil and plenty of sunshine, irrigation and cultivation have done the rest; and the result to-day is thousands of acres of beautiful trees in bearing, averaging about a hundred trees to the acre.

L 1

The celebrated "seedless navel orange," first produced in Riverside, practically gave South California its world-wide reputation for orange-growing; and this orange has completely thrown into the shade other varieties—such as Mediterranean Sweet, Valencia, Ruby and Malta Bloods, St. Michael's, and others less known. Growers have discovered that, for size, flavour, and steady bearing, no other orange can compete with it.

The first year of the orange-tree's life in the orchard is a most critical period in its existence, because it has just been transplanted from the nursery, in which, during its growth for three or four years from the seed, it has been carefully nurtured, and is then worth from 50 cents to 1 dollar—that is, 2s. to 4s. The young trees are planted in the orchard in rows accurately measured off, 18 by 20 feet apart.

The Washington navel orange-tree fruits the first year in the orchard, but it is only said to be in bearing the third year; and from that time it must be fed and watered with the greatest care if, at the age of twelve years, it is to produce 700 lb. or 800 lb. of fruit. Many of the most successful groves are of comparatively old growth, planted some twenty-two to twenty-five years ago; but the health and productiveness of these trees have been maintained by the generous expenditure of fertilisers—often amounting from 1 ton to $1\frac{1}{2}$ tons to the acre, consisting of guano with necessary proportion of potash and sulphate of iron—and also by the regular irrigation in summer every thirty days, and by incessant cultivation or breaking up of the soil, which is so apt to become baked by the sun. In the first instance the virgin soil is extremely fertile, but it cannot be drawn upon year after year with impunity; and the pioneers discover this, to their loss, when the decadence of their orange-trees became evident. Young orchards pay while the soil is virgin; but it is no economy to spare either water or manure after the first year or two of bearing, if the orchardist wishes his trees to maintain their productiveness. Some growers state that slight blemishes on oranges denote too rich feeding of the trees; but I believe this opinion is held only by a minority.

The grower has practically nothing further to do with the oranges after they leave his orchard; the sorting, cleaning, grading, and final packing for the market are in the hands of the association packing-houses—unless, of course, the grower himself has been able to establish a brand and a packing house of his own. Usually the grower is supplied with boxes by the association, and into them the oranges are loosely packed by his pickers, piled up on wagons, and taken into the packing-house. There the teamster receives a cheque or credit note for the owner, and these are kept three or four months, and used to check the amount then receivable from the association. The price depends upon the kind of season, also upon the grade of orange, and runs from about 90 cents (3s. 7d.) or 1 dollar (4s.) up to 2 dollars 50 cents (9s.) a box, the average being 1 dollar 15 cents (4s. 7d.).

The first process at the packing-house is to weigh the fruit, and label it with the name of the owner, then put it aside for the brushers. In large houses the brushing is done by a machine; in smaller houses by boys and girls, who use small hand-brushes. Generally the packing machine is conveniently placed so that the oranges roll down an incline to the sorters' table. Here imperfections only are noted, the quick and critical eye of the sorter rapidly rejecting the "culls" as they are called—namely, those oranges even slightly discoloured or blemished. Great piles of these "culls" may be seen in labelled bins ready to be sold to the peddler for 10, 25, or even 50 cents (5d., 1s., 2s.) a box; if totally unsaleable they are returned to the owner, and scattered over the orchard and ploughed in as a fertiliser. The next process is that of grading, by which the oranges are sorted according to size. The grader is a somewhat intricate machine. From the hopper at one end, the oranges roll down an incline by the side of a revolving cylinder, along each side of which are two long slits widening towards the bottom, each size falling through its own special chute into a box below. The three grades of marketable oranges are the fancy, the choice, and the standard. After being graded, the oranges

next come into the hands of the packers, who are marvellously dexterous in their handling. They stand in front of the box to be packed, with the bin of oranges on the right and a bunch of tissue-paper wrappers on the left. Swiftly the right hand takes an orange, simultaneously the left hand seizes a wrapper, a sound of crumpled paper, and—hey, presto!—the orange is in the box. The last layer is left slightly protruding above the side of the box; over this are nailed three or four thin laths, with a space between so that the air may have free access; and from the nailer the box goes direct to the railroad car. Many houses have a siding to the warehouse door. About 360 boxes, weighing 13 tons, are piled carefully into a car; the car is then sealed up, ventilators only being open; a large ticket is tacked to the side to tell where the fruit came from; and at last the oranges are ready for the swift freight train to carry them eastward.

The packing-houses are extremely interesting, and in many instances have cost from 10,000 dollars to 15,000 dollars (£2,500 to £3,750) each, being equipped with the latest machinery, run by electricity, gasoline, or steam-power.

Quoting from the annual midwinter number of the *Los Angelos Times*: "Last spring the assessment returned 2,072,417 bearing orange-trees and 1,227,397 trees in their first year's growth. These citrus trees produced in 1897, in car-loads of 336 boxes each, 7,550; 15,152 car-loads in 1898, and 10,350 car-loads in 1899. The value of the output of 1899 is given by the Chamber of Commerce as 7,000,000 dollars."

Lemons are always included in these assessments, as the railroad lines make no difference between the two shipments when reporting for the trade; as a rule the shipment of oranges is nearly double that of lemons. To the uninitiated there is little difference at a first glance between an orange orchard and a lemon orchard; there is the same precision in planting, the same glossy leaves, the same fragrant white blossom; but, unlike the orange, rarely does one see the lemon in its yellow rind, for it is picked green, and thus the tree is divested of its beauty, for the green lemon is an insignificant object. Latterly the orange, owing to the rivalry among the growers to be the first to ship oranges from California, has been gathered unripe; but these early shipments have brought so little profit to the growers that the fruit is generally allowed to remain three months longer until it is ripe and luscious for the table. Lemons are picked every month in the year; while oranges blossom in April, and the fruit ripens and is shipped from December of that year to June of the following year.

As yet nothing has been done to utilise the large number of "culls"; but, as in France and Italy, manufactories will, no doubt, be started to obtain acids and essential oils from these "culls" when the enormous water-power available in the mountains, at whose feet so many orchards lie, has been fully developed.

Many difficulties have been encountered in the orange-culture of South California, of which not the least has been the white scale, an insect pest which threatened at one time the entire destruction of the orchards. Hundreds of acres were ruined; the trees seemed to be covered with snow, so greatly infected had they become. The climax was reached in 1888-89, when meetings were held by the growers, and the idea was mooted that some parasitic insect should be found to wage war upon this white scale. Half-a-dozen ladybird beetles were imported from Australia by the Agricultural Department, and liberated in an orchard; and in about a year the white scale totally disappeared. Other scales have caused trouble, but to no great extent. Fumigation is successfully resorted to, each tree being covered with a tent, inside which is liberated cyanogen gas. The fumigation is done at night to prevent decomposition of the fumes by the sunlight. It is a curious sight to see a whole orchard enveloped in these coverings, like a huge encampment on a field of battle. Frost, too, is an always expected danger, but it is not experienced to the same extent as by the Florida growers, and frequently two or three years will pass without any damage being done. Wind is almost as great an enemy

as frost, for the waving of the branches causes friction between the leaves and the oranges, the latter being more or less scarred thereby. Great loss, too, is caused by the windfalls, hundreds of oranges being lost to the grower before they have come to perfection. Frost, however, may be considered an insidious enemy, and on that account it is more difficult to fight, for its effects are not immediately apparent; instances have occurred in which the oranges have actually been shipped eastwards in good condition even to the eye of the grower and the packer, only to be declared unsaleable, as, on being cut open, the pulp was found almost rotten. An experiment to obviate the action of wind and frost has been tried—to house the trees collectively under one immense framework of wooden laths so placed at intervals as to admit sunlight and air, but sufficient to break the force of the wind. This scheme has been carried out successfully on the Everest Ranche, Riverside County, with such good results that the production of 17 acres thus covered in has far exceeded that of any previous year. The more common expedient is to plant eucalyptus trees in long rows across the general direction of the wind, thus forming a breakwind, much in the same way as the tea and coffee plants in Ceylon are protected.

Notwithstanding all drawbacks, orange-growing is a pleasant and lucrative occupation, especially when carried on in such a health-giving and equable climate as that of South California.

BEAUTY OF GLEN RETREAT MANDARIN.

Mr. Benson, writing on the Beauty of Glen Retreat Mandarin, says:—"Since writing the description of the Beauty of Glen Retreat Mandarin, which appeared in the November number of the *Queensland Agricultural Journal*, Mr. J. J. Lade, the original owner of Glen Retreat, has given me the following information respecting the origin of this mandarin, which is of considerable interest, as it is clears up any uncertainty that there may be: Mr. Lade took up Glen Retreat in 1851, and went in for wine and fruit growing. In 1872 or 1873, wishing to plant more citrus trees, he obtained a number of selected fruits of both oranges and mandarins from several Brisbane dealers, and planted the seeds of same. Out of the many seedlings raised, Mr. Lade noticed one having a distinct foliage and habit of growth, so that he deemed it worthy of testing, with the result that when it fruited it produced the high-class mandarin now known as the Beauty of Glen Retreat. This variety is, therefore, a purely chance seedling, the particular fruit from which the seed was obtained being unknown. It is, therefore, a Queensland production that has been originated here, and has no connection whatever with Dancy's Tangerine, a fruit which it somewhat resembles."

PROBABLE RISE IN PERFUMES.

The well-known orris-root powder is derived from the roots of two or three species of iris. These particular plants are largely grown in the south of Europe. At a certain stage, their roots are dried and crushed, and the powder forms the basis of many of our most delightful perfumes, both in powder and liquid. The most important of the plantations of iris have now been bought up by a syndicate, who will not sell until, by their abstention from supplying the market with oris root, they have succeeded in raising the price. When they have succeeded in doing this they will sell, and reap a rich harvest out of the pockets of those who will have to pay heavily for their perfumes.

Viticulture.

AUSTRALIAN WINES IN CEYLON.

A Ceylon paper praises the virtues of Australian wines and brandy. The wines are declared to be of such satisfactory body and character that they require little comment. The low price of full-bodied Burgundy—10d. per bottle—ensures for the fortunate people of Ceylon the consumption of such a wine as payment of four times the price in England fails to secure for the purchaser. Australia is Ceylon's best customer for tea, and Ceylon should reciprocate by becoming a good customer for Australian wines.

TREATMENT OF ANTHRACNOSE WITH A COMPARISON OF THE EFFECTS OF VARIOUS SPRAYS AND DRESSINGS.

By E. H. RAINFORD,

Instructor in Viticulture.

The most effective treatment of the vine to prevent attacks of anthracnose or black spot is a subject of much argument and divergence of opinion—one vigneron upholding the efficacy of one cure, and another the superiority of a different one. Any positive knowledge gained on this point would be of great value to Queensland vignerons, as this disease is in some districts a real scourge, and is answerable for the loss of quantities of grapes every season. It is quite true that in many cases the disease is rampant because the vigneron takes no precautions whatever to combat it, either from carelessness or unbelief; but wherever there is too much moisture at the roots or the vines are amid damp surroundings, there the spot will be, and only energetic measures with use of the most effective treatment will keep it under.

With the idea, then, of comparing the effect of different sprays and winter dressings, the writer experimented upon the vines near the creek at Gatton College, nearly all of which last year were very badly affected with anthracnose in consequence of no winter dressing having been applied through some misunderstanding of instructions.

The vines are planted in thirteen rows of twenty-six or twenty-eight vines to the row. These were divided into four lots for treatment by taking six or eight vines of each row, so that each variety should, where possible, be treated in four different ways.

The first treatment used was a winter dressing, composed of a 10 per cent. solution of sulphuric acid or 1 lb. to the gallon of water; and this was applied shortly before the swelling of the buds.

The second treatment used was a winter dressing of a mixture of lime and sulphur, advocated by Mr. Bigg, of Merryfields, Toowoomba, and is made as follows:—7 lb. of sulphur, 3½ lb. of fresh lime, and 1 lb. of rosin are boiled together in 4 gallons of water for three hours—filling up occasionally with boiling water as the mixture reduces. This is the stock mixture. A quart of this should be mixed with 5 quarts of ordinary whitewash made from fresh lime, and a wineglass of Condy's fluid stirred in. The wash should be applied to the vine, after pruning, with a brush, from the surface roots to the extremities of the spurs, removing all loose bark first.

The third treatment was a spray called Eau Celeste, advocated by Mr. Weiss, of Rockhampton, and applied on 28th September. This spray is prepared as follows:—3 oz. of carbonate of copper are mixed with 2 quarts of boiling water. Into this, while hot, is stirred 1 lb. of carbonate of ammonia, not too much at a time, as great effervescence takes place. When all the ammonia is dissolved, the solution should be poured into and kept in a stoppered bottle. This is a stock solution, and will keep for some time. The spray is made by mixing 2½ or 3 fluid ounces of the above to each gallon of water.

The fourth treatment was a spray called the Burgundy Mixture, which was applied the same day as the Eau Celeste—viz., 28th September—and is made as follows: 2 lb. of sulphate of copper are dissolved in 9 gallons of water, and 1 lb. of carbonate of soda (90 degrees strength) is dissolved in 1 gallon of water. The soda solution is then slowly stirred into the copper solution, and the spray is ready.

This is another form of Bordeaux Mixture, made with soda instead of lime, and is preferable for some reasons, more particularly where any difficulty exists in procuring fresh lime, as, unless Bordeaux Mixture is prepared with quite fresh lime, its action is practically *nil*. The Burgundy Mixture must, however, be used up the day it is made, as the copper is soon deposited in a crystalline form, whereas ordinary Bordeaux Mixture will retain its efficacy for some days.

The last four rows of the sulphuric acid section were not treated, but left as witness vines.

The effect of the different treatments is given in a tabular form to give opportunity for comparison. It must be understood that the witness vines do not extend into the other three sections:—

TABULAR FORM of the RESULTS of the DIFFERENT TREATMENTS for ANTHRACNOSE of the VINES at GATTON COLLEGE.

Row.	Sulphuric Acid.			Lime and Sulphur.			Eau Celeste.			Burgundy Mixture.		
	Vines Treated.	Condition on Sept. 28.	Condition on October 18.	Vines Treated.	Condition on Sept. 28.	Condition on October 18.	Vines Treated.	Condition on Sept. 28.	Condition on October 18.	Vines Treated.	Condition on Sept. 28.	Condition on October 18.
1	Royal Ascot...	No spot	No spot ...	Royal Ascot...	No spot	No spot...	Royal Ascot...	No spot ...	Very slight spot	Royal Ascot...	No spot...	No spot
2	F. de Lesseps	,, ...	,, ...	F. de Lesseps	,, ...	Slight spot	,, ...	,, ...	,, ...	,, ...	,, ...	,,
3	Blk. Alicante	,, ...	Traces of spot	Blk. Alicante	,, ...	,, ...	Blk. Alicante	Very slight spot	Spotted ...	Blk. Alicante	Very slight spot	Slight spot
4	,, ...	,, ...	No spot ..	,, ...	,, ...	,, ...	,, ...	,, ...	,, ...	,, ...	,, ...	Spotted
5	Gros Colman	,, ...	,, ...	Gros Colman	,, ...	No spot...	Gros Colman	No spot ...	No spot ...	Gros Colman	No spot...	No spot
6	Black Prince	,, ...	,, ...	Black Prince	,, ...	Spotted ...	Black Prince	Very slight spot	Spotted ...	Black Prince	Very slight spot	Spotted
7	Monukka ...	,, ...	Spotted ...	Goethe ...	,, ...	No spot...	Goethe ...	No spot ...	No spot ...	Goethe ...	No spot...	No spot
8	,, ...	,, ...	,, ...	Golden Champion	,, ...	,, ...	Golden Champion	,, ...	,, ...	Golden Champion	,, ...	,,
9	Blk. Hamburg	,, ...	No spot ...	Monukka ...	,, ...	Spotted ..	Monukka ...	Spotted ...	Very spotted	Monukka ...	Spotted ..	Very spotted
Witness Vines. 10	,, ...	,, ...	Spotted ...	Blk. Hamburg	,, ...	,, ...	Blk. Hamburg	Slight spot	Slight spot	Blk. Hamburg	No spot...	No spot
11	Isabella ...	,, ...	No spot ...	Isabella ...	,, ...	No spot...	Isabella ...	No spot ...	No spot ...	Isabella ...	,, ...	,,
12	Lady Downe	,, ...	,, ...	Lady Downe	,, ...	,, ...	Lady Downe	,, ...	,, ...	Lady Downe	...	
13	Syrian ...	Spotted	Very spotted	Alvey ...	,, ...	,, ...	Syrian ... Alvey ...	Spotted ... No spot ...	Very spotted No spot ...	Syrian ...	Spotted ..	Very spotted

An examination of the results of the different treatments shows no appreciable superiority of either of the sprays over the other, but the acid dressing proves more effective than the lime and sulphur. The superiority of the two winter dressings over the sprays is incontestable. Nevertheless, before condemning the latter as inferior, further trials are necessary, as no greater mistake can be made in experimental work than hasty generalisation founded on insufficient observation. The sprays have not had a satisfactory trial, and for this reason: The vines treated number about a dozen varieties—some of which, like the Royal Ascot and F. de Lesseps, started early; and others late, like the Lady Downe. Spraying was delayed until all the vines were sufficiently developed to be able to spray them, with the result that the earlier varieties in some instances already showed signs of spot, as will be seen in the table under the heading of "Conditions on 28th September," the date of the spraying. The experiment would be more satisfactory if made upon varieties starting into growth simultaneously.

An examination of the table shows that in only one instance were vines free of disease at the time of spraying subsequently attacked, and that very slightly; on the other hand, vines that were spotted before the sprayings became worse in all cases. One result of this experiment, then, is to clearly prove that for sprays to be effectual in checking black spot they must be applied *before* the disease has made its appearance, say when the fourth leaf has developed.

The witness plot shows that anthracnose is much less prevalent this season than last in the College vines, as the Lady Downe and Syrian last year were a mass of spot, whereas the attack this season is much milder. This fact may also affect the value of the spraying results.

Comparing the acid and lime and sulphur dressings, it will be seen that with the former only two varieties were attacked—viz., Black Alicante and Monukka; whereas, with the latter four varieties were attacked—viz., F. de Lesseps, Alicante, Black Prince, and Monukka; showing a superiority in favour of the acid dressing. But, even granting equal effectiveness, the acid dressing is quicker and more easily made, and is without the offensiveness of the lime and sulphur dressing.

However, as said before, further trials would be useful to confirm or not the results obtained. Unfortunately—shall we say—there are no diseased vines to experiment upon at the State farms: all are in a robust state of health, except for, here and there, an isolated spot or so quite useless for purposes of experiment and comparison. To continue the trials, appeal must be made for permission to treat diseased vines in other vineyards. Should anyone possessing a block of vines pretty badly attacked by anthracnose this season wish to have them experimented upon next year, the writer would be glad to receive communications on the subject.

FAILURE OF THE CURRANT CROP.

News has come from Greece that the entire currant crop has been utterly destroyed by a blight (*Peronospera*), which has had the effect of rotting the young grapes. Thousands of tons of currants are ruined. The consequence must inevitably be that the price of currants will be very high, perhaps as high as in 1853, when they were sold retail at 1s. 6d. per lb.

Horticulture.

ORCHIDS.

Paper Read by Edward Grimley at a Meeting of the Queensland Horticultural Society.

Some few months since, when it was suggested that this society should endeavour to have a paper read at each meeting, being anxious to fill a gap I volunteered to read a paper on "Orchids," but I can assure you I have been regretting it ever since, as there are so many better able to tackle such a large subject than I am. However, I may be able to show you a skeleton for others with more experience to add the flesh; anyway, the few words I read may lead to a discussion that may be interesting.

It is pretty evident that in the minds of most people orchids are associated with an idea that they can be grown only by the wealthy, and then only by those having a great knowledge of the subject; these ideas are quite delusive, as many most beautiful orchids can be purchased at quite a reasonable price, only a few shillings apiece, although extreme prices are still realised for new or rare varieties; nevertheless, orchids are within the reach of anyone having a taste for horticulture, and this is the more emphasised in this fair colony of Queensland, where our genial climate will permit many of the most beautiful sorts to grow without any artificial heat, and in some cases without even a glass house.

Then, again, the idea that great knowledge is required to grow orchids is equally erroneous, as with the assistance of small text-books, which can be cheaply purchased nowadays, anyone can pick up sufficient information to make a fair success.

The advantages of growing orchids over other plants are their extreme beauty and the great length of time many will last in bloom; many will last three or four months. I have had a *Cypripedium Spicerianum* in bloom for four months, and I believe I am right in saying I had an *Oncidium unguiculatum* in bloom six months; then, again, with but a small collection one may have blooms all the year round, as orchids vary in their time of blooming—some in summer, spring, autumn, and winter. Probably the greatest objection to growing orchids is their want of foliage during a good time of the year, but this objection does not apply to all, as many have nice foliage, such as *Cypripediums*, *Cattleyas*, *Cymbidiums*, &c., and the objection is further removed by growing some good ferns along with your orchids, as the same conveniences are suitable for both orders of plant life; also a few Aroids, such as *Caladiums*, *Marantas*, and such like, take off any bareness that may be suggested.

As a short paper like this will not allow time to go fully into all details respecting orchids, I think we had better, this evening, confine our attention more to the growth of the plants, and leave all matters connected with varieties for another evening.

Orchids are generally divided into two sections—epiphytal and terrestrial orchids; but I think it would be better to recognise three sections, as those that grow on the trunks of trees differ in their mode of growth very widely from those that grow in the forks of trees, as in that position they are fed by a quantity of leaves which are caught by the forks, and which in time become leaf-mould when rotten, whilst those that grow on the trunks have only the rain and what their roots can take from the bark of the tree. Taking the epiphytal section first, such as *Dendrobiums*, *Cattleyas*, *Oncidiums*, &c., I will now proceed to give you my ideas of the compost that should be used for such.

The usual compost, according to the textbooks, is 1 part sphagnum, 1 part peat, with a good deal of charcoal and crocks to keep the compost open.

I find peat is not obtainable here, but we have an excellent substitute in our staghorn fern, but I prefer the bird's-nest fern, as sometimes the staghorn fern is a bit sour; now, with regard to sphagnum, I find there is an element of danger in using such, not so much in the sphagnum as in the water. I find that when you use rain water you can keep your sphagnum quite fresh and green; but when you use water from the mains the sphagnum seems to act as a filter, and in time collects enough muck to make it quite greasy to the touch, like a sponge greasy with soap; this an orchid seems to resent, and will gradually die if an alteration is not made.

As so many of us are dependent on the mains for our supply of water, it will be best to leave out sphagnum altogether from your compost, and use bird's-nest fern broken into lumps about the size of a walnut, and lumps of the same size of tree fern (*Dicksonia antarctica*, I think), together with charcoal and crocks. This, in my opinion, will make a better compost than the text-book formula, as it allows of air getting to the roots. This is, I think, important, as we find that most orchids in a state of nature grow with their roots exposed to the air, whilst, if you use sphagnum in your compost, it is apt to prevent air getting at the roots.

Having said this much about composts, I will now go on to the modes of potting or blocking; there are three modes used—viz., potting, baskets, and rafters or blocks.

I will take *potting first*. The first thing to do is to attend to the *drainage*. Let your crocks be clean, and of two sizes, about the size of walnuts, and say the others the size of beans to fill up the interstices. Fill up your pot to fully one-half with crocks, or even to two-thirds. Let your pot be quite clean, and, if you are using a large-sized pot, you might place a small pot over the hole for drainage. To make sure of perfect drainage, place a little moss over the drainage; sometimes the compost rots, and is apt to clog the crocks, and the moss will prevent that.

Having your drainage arranged without the possibility of failure, you then proceed to place your plant in the pot. The mode of carrying out this operation differs according to circumstances. If you are potting a new plant, I should advise you to attach your orchid to a stake—say a piece of wood or a piece of tree fern; ram your stake down the crocks, right down to the bottom if you can, so as to assure firmness in potting, then gradually building up the compost up to and over the top of the pot—the height above the pot depending on the size of the pot. Let the crown of your plant rest on the top of the compost. By the crown is meant, of course, that part of the plant from where the roots start. As I said before, I think it better not to let your compost be too close, but to allow air to permeate the compost. If you are repotting a plant you cannot very well attach your plant to a stake, and will require to be very careful not to break any new roots that may be starting. If there are any such on the outside of the pot, you must try to ease them off with a penknife. If there are a mass of roots—that is, roots with sap in them—attached to the inside of the pot, then it may be better to break the pot, and pick away all you can—that is, pieces of the pot and any of the compost that will come away without breaking the new roots. It is considered better not to water for a day or so before potting or just after.

And now for baskets: They can be made of beech, cedar, or any lasting wood. Perhaps the best wood is American redwood; it is nearly indestructible and easy to work. There are some orchids that do well only in baskets, but I cannot spare time to make a list of them. Then, again, some only show their beauty when their pseudo-bulbs are hanging from a basket. The same kind of compost is to be used in baskets as in pots, according to the variety.

In placing plants in baskets you still require to use some drainage, but not so much as in a pot; and you build up your compost as in pots, with the crown of your orchid above the compost.

Now, as to blocks or rafters, as some of them are called; they can be made of the same wood as the baskets, and of a size according to the plant; some

use ti-tree, but I do not like it. I find it encourages a fungus growth. I think the very best block is a piece of tree fern. Some people cover their block with sphagnum, but that I do not think is necessary. Tie your orchid very firmly to your block with copper wire in preference, as copper does not corrode; string rots very soon. Now, you may ask which is the best system of growing your treasures. I would say that a combination of the block system with potting is the best of all, unless necessity points to baskets. I find it very difficult to keep blocks always damp in the growing season; but, by placing your blocks in pots with the crown quite out of the compost, you derive the advantages of both systems; in summer it seems quite impossible to keep blocks damp, unless someone is always in attendance, and that is a state of affairs few of us can manage.

Now when to repot: In what I have said I have supposed the orchid required repotting. How is one to know? If the growing point or points of your orchid are so situated that the new roots cannot enter the compost, then a plant requires repotting; this I take to be essential to the healthy growth of an orchid. I believe an orchid, if it cannot attach its roots to something, will gradually fall away and ultimately die; and you will find it a good plan in potting to place your growing point inwards so as to ensure nourishment to the roots. Then, again, your pot may be so full of roots that the goodness is all exhausted, or, possibly, you may think some of the compost is exhausted, and yet the pot is not full of roots; then you can re-surface by taking away some of the old soil or compost and replacing it with new. As in all pot plants of every description, you must avoid over-potting; it is even more important in orchids than in most other pot plants.

As to the exact time to repot an orchid, you will require to watch the growing point pretty carefully, and directly you see any sign of new roots starting then is the time to repot; if you wait until the new roots are a quarter of an inch long you stand a good chance of breaking them in the process of removal. I think it is better to await new roots from the growing point rather than to repot when the old roots are lengthening, which they do sometimes before the growing point begins to root.

The system I have endeavoured to describe is generally applied to such as *Dendrobiums*, *Cattleyas*, *Oncidiums*, &c., but such as *Vandas*, *Phalanopsis*, and *Ærides* are generally treated somewhat differently by orchidists, the main difference being that the peat is omitted in the compost. I suppose experience has taught them that this is necessary, but I cannot see why it is so; so far as I can gather, this class of orchids grow on trunks of trees the same as Dendrobes, and I have seen some of the class flourishing with nearly all their roots outside the pot and rooting on to the posts of a greenhouse—a very different mode of growth to that of employing only wet sphagnum. I therefore cannot see any cause for using a different compost for these orchids.

POTTING TERRESTRIAL ORCHIDS.

The same rule for repotting applies to terrestrial as to epiphytal orchids: that is, just after they begin to grow, and not until the signs are evident. The compost differs very materially from the compost for epiphytal plants, and I use as follows:—Take one part good rotted turves, broken into lumps as large as a walnut, one part staghorn fern, half a part of lumpy cow-dung, and half a part of coarse sand or brickdust; mix together, and add plenty of charcoal and broken crocks.

For drainage use broken pots to, say, one quarter of the height of the pots with a layer of moss on top to ensure thorough drainage. Then pot up your plant and bury the crown of your terrestrial orchids—differing in this from the tree orchids; let there be a good space between the top of your soil and the edge of the pot, to allow of thorough watering; many put a layer of sphagnum on top of the pot, but I do not think it necessary. I sometimes use bush moss for the purpose, and sometimes selaginella—either seems to hold the moisture; but it is not necessary to use anything.

I find there is one class of *Cypripediums* that do not like their crowns buried, such as concolor, nireum, &c. Some of the *Cypripediums* grow on trees, and would in such a case not like their crowns buried. The third section, or those that grow in the forks of trees, should have, as in Epiphytes, the same attention as to drainage but some leaf mould or rotted turves in a lumpy state may be added to the compost used in epiphital orchids.

WATERING ORCHIDS.

As probably much of your success in growing orchids will depend on the way you water them, I will try as far as lies in my power to explain how they should be treated.

When a plant is just beginning its new growth the new roots are not able to take up much moisture, consequently very little must be given at the roots, but a moist atmosphere can be kept at all times except on cold dark days in winter ; so sure as you give much moisture to a plant unable to assimilate it, so sure will it suffer ; it is like giving food to an invalid—they resent it and damp off.

As root growth proceeds you must increase your root moisture until when in active growth you can hardly give most orchids too much moisture. A time will come when the new pseudo-bulbs have made their full growth, mostly about May in each year, when you must gradually withhold water at the roots, until in the winter the epiphytal sorts will require either none or very little, only just enough to keep the pseudo-bulbs from shrivelling up, in which case you may give just a little water. I find staghorn fern retains water very much, and you will require to be very careful about using water. I had a nice plant of Den Nobile growing on a lump of staghorn, but through getting a little too much moisture the bloom buds gradually turned into growth. Nearly all orchids rest in the winter, and will require to be kept at rest by the gradual withdrawal of water, but there is a number that will keep growing through the winter, amongst them *Ærides*, *Vandas*, &c., and these will require to be kept damp but not so wet as in summer. Speaking generally, plants with large pseudo-bulbs can stand a long period of withdrawal of water, whilst those with thin bulbs require to be watched so as not to shrivel too much.

HOW TO MANAGE ORCHIDS RECEIVED FROM ABROAD.

If you get a consignment of orchids from the North, or from a foreign country, and those orchids are what is called "collector's stuff"—that is, plants that have not been under cultivation—it is as well to spread them out to dry for a little time in case there may be an inclination to heat; when all surface moisture is evaporated, you must either pot them or block them, but not pot them in the usual manner with compost, but after cutting away all the old roots then pot them in crocks only, with the crown well above the crocks, and do not give any water at all, but keep in a damp atmosphere ; when new roots begin to appear, then pot them in the ordinary orchid compost, giving very little water at first and gradually increasing the water as roots are made. If you decide to block them, then take care to see that the crown of the plant is fixed, say, about the middle of the block so as to allow room for root action ; possibly even above the middle of the block may be better. If the block is of wood, it does not matter if a little water gets to these new plants, but if the block is of such a nature as to retain moisture, then do not water at all but keep in damp atmosphere; as roots appear, so increase the water, but of this be very careful. If your newly imported collector's stuff is a ground orchid, then pot as usual after surface moisture, but be very careful to give but little water at first, drying off gradually increasing the quantity as roots appear.

I have written on this subject supposing that you have only a glasshouse without heat, as I think but very few in Queensland have heated houses, and, moreover, those who have heated houses are probably in an advanced stage of horticultural education, and I do not look to tell them anything. Now, with regard to the varieties to grow, supposing you to have a greenhouse without heat

in winter, I would suggest that you grow *Cattleyas*, *Laelias*, *Oncidiums*, *Angraecums*, *Calanthes*, *Cymbidiums*, *Cypripediums*, *Vandas*, *Aerides*, and some of the *Dendrobiums*. I say *some* only of the popular *Dendrobes* as I find some do easily and some do badly; probably, the explanation is that a house without heat in winter is too cold for those that come from the tropics. I find our native *Dendrobium bigibbum* family do not thrive here under the conditions mentioned, and I think the cause is that the heat is insufficient, especially in winter, as I have seen them doing well in Sydney with heat. I would suggest that as a guide as to what to grow to choose those plants usually grown in an "intermediate" house in the old country. One or two of the genus usually grown in such houses do not seem to thrive here, such as *Coelogyne cristata* and some of the *Odontoglossums*. The reason given is that the heat is too great; and you will do well to avoid those that require extreme heat, including *Phalænopsis*.

There are several other points or matters I might bring forward, but I am afraid of making my paper too long, such as propagation of orchids, growing orchids from seed, insect troubles, &c., but I have confined myself mainly to composts, potting and watering, which includes resting. I take it that the main points in growing orchids are—thorough drainage, proper style of compost, proper time to repot, watering and resting, and when once a grower has mastered these initial proceedings there need be no fear of want of success, and with a little success you will feel yourself amply repaid for your work; no other pot plants will give you such satisfaction. The glorious colours, the fantastic shapes, the great length of time that the blooms last, all tend to make orchid growing the most fascinating branch of horticulture—at any rate, of indoor gardening. You may begin with the humble begonia, the delicate ferns, the majestic caladiums; but in settled countries enthusiasts mostly end with orchids; they are at the very top of the tree, and you feel that you cannot go any higher.

Ladies and gentlemen, I have given you what little experience I have had, and, if not highly instructive, we may at least get a pleasant half hour's talk over the paper, and, if opportunity admits, some day we may have a chat about varieties and other matters omitted in this little effort.

PROPAGATING ROSES.

A novel method of propagating roses has been hit upon by an American grower. The well-known variety named Madame Plantier does not root readily from layers, so one autumn he laid out all the shoots of a dwarf bush on the ground, arranging them like the spokes of a wheel, and then covered them with 6 inches of fine earth. This heavy covering was not removed in the spring, and the buds were obliged to come through it. They blossomed wonderfully, and grew with great vigour, and thirty-five plants were dug from one hill. Each sprout had thrown out a root. The ground below and above the roses must be of good quality.

SORGHUM FODDER

We have received a communication from Mr. C. Benson, M.R.A.C., Deputy Director of Land Records and Agriculture, Madras, in which he draws attention to an article in the *Madras Agricultural Ledger*, No. 24, 1896, published by the Government of India, by Veterinary Captain Pease, on the subject of the poisonous qualities of sorghum fodder. Captain Pease attributes the poisonous character which sometimes attaches to sorghum fodder to the amount of nitrate of potash found in the stems.

Tropical Industries.

SUGAR ITEMS.

During the past seven years Queensland has sold sugar to the value of £6,500,000. Last year £1,163,010 was paid into the colony for this single article of produce. The loss to the working classes by the destruction of this industry would amount to the wages at the fifty-eight mills and ten juice-extracts plants alone, of nearly 4,000 white men. There are in addition some 3,000 farmers, who grow cane for the mills. Probably 8,000 Europeans are employed outside the factories pretty well all the year round, besides some 10,000 indirectly engaged in the industry. Thus there are actually some 25,000 white men employed to 9,000 kanakas, the labour of one of the latter enabling employers to employ nearly three whites. These 9,000 kanakas are employed in the field, but it is with great difficulty that the number can be kept up to the figure.

In 1899 Queensland exported 109,045 tons of sugar to Europe, the Australasian colonies, China, and Japan, &c. Does it ever strike any of those who cry aloud against black labour to try and calculate how many white men earn bread for their wives and families by means of this annual output of sugar? Do they ever consider the operatives in British factories who make the linen for the bags, the twine and the needles, the men who navigate the ships which carry it, the engineers who make the machinery—worth in Queensland probably some three millions? Again do they consider the numbers of horses and teamsters employed in the industry both on the plantations and in the cities? Wharf labourers have to handle every ounce of the sugar. How many comfortable homes are the direct result of the sugar industry? For every coloured labourer sweating in the canefields there are a dozen white men and women earning good wages, which they would not be able to earn were it not that their employers are enabled to pay them those wages through the means of these reliable, yet not too cheap, coloured workers. Every ton of sugar produced in the colony is worth from £4 10s. to £6 to the cane-producers, mostly hard-working men who, by sugar-growing alone, provide comfortable homes for their wives and families, and indirectly for thousands of wharf labourers, teamsters, and draymen's families.

Such an industry is well worth fostering, not by bonuses, but by assistance to introduce superior methods of cultivation by which heavier crops and a higher sugar content may be obtained. During the present season a Finn engaged in sugar-growing took 70 tons of cane off 1 acre of his land, where others were only getting from 17 to 20 tons. It may be presumed that the land was rich, new, scrub land; but is it not within the power of science to put even worn-out land into the same condition by means at once cheap and effective? This is what it is hoped that Dr. Maxwell will bring to pass. He will be here by the time this *Journal* goes to press, and he arrives at the right time to at once put existing and intending planters on the right track. Should his work have the result of increasing the sugar output by 9 tons of cane or 1 ton of sugar, the black labour question would cease from troubling. It would gradually die out, especially if it should come to pass that the work of "trashing" is found to be superfluous, and an effective cane-cutting machine be invented. We have seen the introduction of a very useful cane-planting machine, and there is little doubt that ere long some inventive genius will discover a means of mechanically cutting and topping cane plants in whatever condition the crop may be, whether uneven in height or blown over by the wind. When that comes to pass the need for the kanaka will pass away, and the Northern canefields will no longer be the terror of the white man.

TRADE IN DRIED LEAVES AND FLOWERS.

The *Tropical Agriculturist* (Ceylon) takes the following from the *Indian Forester* :—Mr. E. Rudowsky, commission agent, 14 Weinligstrasse, Dresden, Germany, asks us to draw the attention of our readers to the great possibilities there exist of opening up, between India and Europe, a remunerative trade in dried leaves and flowers such as are extensively used in Europe for decorative purposes. Mr. E. Rudowsky, in his letter, states :—"Our selection at the present time is very limited, and the steady growing demand in Europe compels us to seek for fresh fields to make up deficiencies, and, as India has plenty to offer in that direction, there is a good way of opening new and profitable markets for such produce, and thus helping the colony. To give you an idea of the possibilities of the trade, I will only mention that the so-called 'Cape-flower,' a small dried flower, is imported from South Africa in hundredweights and tons, and I do not see why similar results should not be achieved gradually from India as well. Articles of this kind should be gathered with about 3 to 4 inches stem, as the case may be, so as to fasten to wreaths, bouquets, &c., well dried and packed in 10-lb. boxes (the limit the postal authorities carry), and sent by post. As they are light in weight, a 10-lb. box would hold several thousand. Any dried leaves, flowers, &c., which are attractive enough to lend themselves for decorative purposes, would certainly be well appreciated here." Mr. E. Rudowsky informs us that he will be glad to answer any further questions; to receive samples; and to give quotations. His address is given above.

[Might there not be here an opening for light and remunerative employment for our Queensland girls and boys ?—Ed. *Q.A.J.*]

COTTON-GROWING.

By A. J. BOYD.

The serious shortage in the last cotton crop in the United States, amounting to a decrease in production of over 1,800,000 bales, equal to 720,000,000 lb. (putting the weight of the bale at 400 lb.), has given rise to a supposition in the minds of some agriculturists that the cotton-growing industry might be revived in Queensland. All old colonists will remember, that during the period between and during the years 1861 to 1865, the civil war in the United States, the devastation of the fertile cotton districts in the Southern States, caused what is known as the cotton famine in Lancashire. In the previous year, 1860, the United States produced 4,824,000 bales. On the breaking out of the Civil war, the cotton ports of the States were blockaded by Federal ships, and very few cargoes were successfully run through the blockading fleet, and the main supplies of the British markets were obtained from India, which sent in 1866, 1,847,760 bales, averaging during the war 1,000,000 bales. The American cotton fields did not produce much for several years after peace was declared, as the now emancipated slaves refused to work. In 1860, thirty-five countries began to contribute cotton to British manufacturers, Queensland amongst the number. In the whole colony in that year there were but fourteen acres grown. The following table will show clearly the rise, progress, decline, and fall of the industry in Queensland :—

Year.	Acres.	Total Exports.	Average Value per lb.
		lb	. d.
1860 ...	14	nil ...	nil
1861 ...	395 ...	nil ...	nil
1862 ...	392 ...	14,344 ...	1 11$\frac{11}{14}$
1863 ...	2,021 ...	31,557 ...	1 11$\frac{1}{10}$
1864 ...	479 ...	38,730 ...	2 2$\frac{1}{4}$
1865 ...	477 ...	145,820 ...	1 8

Year.	Acres.	Total Exports. lb.	Average Value per lb. s. d.
1866	2,884	207,272	1 $10\frac{4}{5}$
1867	8,149	412,941	1 $3\frac{1}{2}$
1868	11,453	1,809,628	1 $2\frac{3}{4}$
1869	14,426	1,118,899	0 11
1870	14,674	1,630,755	0 $10\frac{3}{4}$
1871	12,962	2,602,100	0 $7\frac{1}{3}$
1872	12,002	148,6,987	0 $9\frac{1}{2}$
1873	9,663	1,375,216	0 $8\frac{1}{2}$
1874	4,149	979,875	0 8
1875	1,674	314,454	0 $6\frac{1}{4}$
1876	573	137,812	0 $6\frac{1}{6}$
1877	276	221,689	0 $7\frac{1}{2}$
1878	37	43,532	0 $6\frac{3}{4}$
1879	105	26,261	0 6
1880	619	108,860	0 $7\frac{1}{10}$
1881	973	266,289	0 $7\frac{3}{4}$
1882	1,082	248,029	0 $7\frac{1}{2}$
1883	316	80,689	0 $10\frac{1}{5}$
1884	49	28,856	0 $8\frac{11}{14}$
1885	50	19,241	0 $7\frac{11}{19}$
1886	15	1,548	0 $6\frac{1}{3}$
1887	nil	nil	nil

It will be seen that after the year 1872 cotton-growing in this colony began to decline, and of the thirty-five countries exporting cotton to England scarcely any continued to do so, all finally failing, unable to compete against the United States, where cotton now again reigned as king. The American cotton crop of 1898 produced 10,897,857 bales, valued at 319,491,412 dollars. Of this quantity 7,648,699 bales were exported (bales averaging about 470 lb. net weight), 3,532,101 bales going to the United Kingdom, which requires annually about 3,400,000 bales. Japan imported in that year 224,214 bales of 500 lb. each, net weight, of a total value of 7,428 226 dollars or, roughly, £1,547,547 in British currency. We shall discuss the possibilities of opening up a cotton trade with Japan further on. Meanwhile let us see what is the total cost per acre of producing a crop of cotton in this colony.

The best sort of soil for the requirements of the cotton-bush is a good, sandy loam. Very rich black soils are not so suitable, as the plants run too much to wood, and hence bear less heavily, and in addition, such soils are harder to work, especially in the event of long continued wet weather. It should be ploughed to a depth of 6 inches, then well harrowed and reduced to a fine tilth. The next thing is to draw out drills for the seed, about from 4 feet to 5 feet apart, to a depth of about 3 inches—not deeper—clean, and straight. This work should be completed by the end of September. The seed should be carefully selected, only the very best varieties. In the palmy days of cotton-growing in Queensland, there were at least fifty varieties of seed grown, all known as "New Orleans"; much came from Egypt, some from India and Europe. Then there were the long-stapled cottons of the South Sea Islands, of the Brazils, Demerara, West Indies, and Egypt. The short-stapled, which were universally grown here, comprised those furnishing the produce of the Southern States of America, which are grown back from the sea board, and are called Uplands, Orleans, Alabama, Mobile, &c. Sea Island cotton, although the more valuable owing to the length and fineness of its staple, was never extensively grown here, as it was found to run too much to wood, and not to bear so profusely as the short-stapled varieties.

Where seed is plentiful, bags of it may be left at intervals on the headlands, and the sower provides himself with a basket or some convenient receptacle, and goes up and down the drills dropping the seeds into the drills as fast as he can walk. If the seed is good, almost all will germinate, but it is well to sow thickly, as the crickets and other insects will destroy a vast number of the young plants. The seed being sown may be lightly covered by taking out the front and back line of a scuffler and running it up the drill. This is a better plan than harrowing. A good coverer may be made of a piece of hardwood about 2 inches thick 6 inches broad and say 2 feet long. Notch this coverer in the middle so that it will lie nicely on the row. When it is carefully drawn over the seeds, it will not only cover it effectually, but will leave a slight ridge and smooth away the soil on each side. There are, however, to-day many modern appliances for sowing and covering which do the work well, expeditiously, and cheaply.* When the young plants have put out their third leaf the cultivation commences by thinning out. This is done either by hand or plough, and all plants should be cut out except bunches left at regular intervals of from 2 feet to 4 feet, according to the fertility of the soil. When the plants have attained a height of 12 inches further thinning is necessary, only three plants being left, and when these attain to 18 inches two may be withdrawn, the third being now able to hold its own against insect attacks. Now cultivation of the usual kind for destroying weeds and loosening the soil may be carried on, and in all this there is no practical difference in getting in and cultivating a crop of cotton and a crop of maize. Both are equally simple.

In about two months after sowing, the trees will begin flowering, and, supposing the pods to have escaped much damage from the boll-worm and cotton-bug, the farmer may now be said to have arrived at the most pleasing part of the work connected with this most beautiful of all crops—the picking. It is customary to hear people who have never grown cotton talk about the heavy expense of picking. This is quite a mistake. With a good, heavy crop, one active man is able to take off from six to even ten acres of cotton. When the bolls are well opened, even girls and boys can pick 100 lb. a day each, and even 130 lb. and 150 lb. have been picked under exceptional circumstances by one man. Taking the average of 1,000 lb. to the acre, and calculating the picking to extend over twelve weeks, it will be seen there is no occasion to rush the work. The price usually paid for picking was ½d. per lb., and at this price four children of a family could easily earn from 12s. to £1 per day. Cotton may be known to be ripe as soon as the boll is fully opened, and the wool comes away freely from the husk. As soon as the farmer notices a quantity in this condition, he should start picking at once. Only the fully burst bolls should be taken. When picking commences, the cotton should be spread out in the sun on tables, or stretchers, or tarpaulins to dry thoroughly, and harden the seed. A few hours suffice for this.

The cotton, having been housed, is now ready for sale to the ginning houses, where the lint is separated from the seed by machines called "gins." They are either roller or saw gins. The machines and the process of ginning need not be described at present.

The great questions before us are:—What does it cost per acre to produce the cotton? What market exists for it? What price can the purchaser afford to pay the farmer per lb.? I have already shown that to produce an acre of cotton plants costs no more than to produce an acre of maize plants.

Now, what does it cost to grow an acre of maize? Mr. W. D. Lamb, of Yangan, in a paper read before the Agricultural and Pastoral Conference held at Rockhampton in May, 1898, set the cost down at £2 1s. 8d., including 10s. an acre as rent of land. If a farmer owns his land and has already cleared the cost of it, that 10s. may be omitted, and thus the total cost would be only £1 11s. 8d. per acre.

* The seed would now be sown with a cotton seed drill which drops the seed in any way required.

This is how it works out, omitting the rent :—

	£	s.	d.
First ploughing	0	4	0
Second ploughing	0	3	0
Harrowing	0	1	0
Planting	0	1	6
Harrowing twice at 9d.	0	1	6
Disc harrowing twice	0	2	0
Pulling maize	0	3	0
Carting maize	0	2	6
Threshing 40 bushels at $1\frac{1}{2}$d. per bushel	0	5	0
Drawing to rail	0	3	6
Ten bags at 5d. each	0	4	2
Seed maize	0	0	6
	£1	11	8

The cost of ploughing would probably be higher below the Range, but one ploughing may be dispensed with ; thus the total cost would be much the same.

With maize selling at 2s. 3d. per bushel, the profit is £2 18s. 4d.

How will this compare with cotton-growing ?

The first six items will, of course, be identical for either crop—*i.e.*, 13s.

With a 1,000-lb. crop, the picking at $\frac{1}{2}$d. per lb. would come to £2 1s. 8d. per acre. Bags would cost the same, and drawing to rail 2s. 6d. Seed cotton after the first year would cost practically nothing, as the farmers would interchange with each other. Thus we have as the cost of growing an acre of cotton and placing it in the railway-shed—

	£	s.	d.
Ploughing, harrowing, and planting	0	13	0
Picking 1,000 lb. at $\frac{1}{2}$d. per lb.	2	1	8
Carting to barn—say	0	1	6
Bags	0	4	2
Drawing to rail	0	2	6
	£3	2	10

In order to make a profit equivalent to that of maize-growing, the cotton farmer must receive a gross sum of £6 1s. 2d. At $1\frac{1}{2}$d. per lb. his cotton would bring him £6 5s., leaving him a profit of £3 2s. 2d., or three-tenths more than the profit on an acre of maize.

Let us now see whether the purchaser could afford to pay the farmer $1\frac{1}{2}$d. per lb. for cotton in the seed ; 1,000 lb. cotton in the seed represents about 400 lb. ginned cotton—

	£	s.	d.
1,000 lb. at $1\frac{1}{2}$d per lb.	6	5	0
Ginning at $\frac{1}{4}$d per lb.	1	0	10
Bale	0	2	6
Cartage on the bale	0	0	$4\frac{1}{2}$
Dumping*	0	0	0
Outward wharfage, 1s. per ton	0	0	$2\frac{1}{2}$
Harbour dues, 2s. per ton	0	0	5
Brokerage in Liverpool on value of 400 lb. cotton at $4\frac{1}{2}$d. per lb., £7 10s., at $2\frac{1}{2}$ per cent. ...	0	3	9
	£7	13	1

* Some shipping firms make no charge for dumping.

Thus approximately the cost to the purchaser would reach 3s. 1d. more than he would receive for his cotton (£7 10s.) if the price in England were 4½d. per lb. Should the price be 5d. per lb. and if the farmers would be content with 1¼d. per lb., a price which would then pay them better than maize, the purchaser would pay £1 0s. 10d. less for the seed cotton, and would receive 16s. 8d. more in the home market, or a total increase of £1 17s. 6d., which added to £7 10s. would make £9 7s. 6d., thus showing a profit of £1 14s. 5d. per bale. There remains the question of the seed. In the olden times the seed was usually thrown away, but times have changed and cotton seed is worth as much as the cotton itself. First of all, cotton seed is to-day worth from £7 12s. 6d. to £9 per ton in the London market. Cotton-seed oil (crude) is worth £23 per ton (224 gallons). Every ton of cotton seed will make 37 gallons of oil. Then the hulls, which are removed by machinery before pressing, are sold for cattle feed. It has been proved by a succession of feeding tests that 10 per cent. of the protein of the hulls was digestible, 38 per cent. of the fibre, 40 per cent. of the nitrogen extract, and 77 per cent. of the fat. As fuel, the hulls were worth about 2s. per ton. As animal food they are worth far more.

After the oil is expressed there remains the well-known artificial food—oil-cake—which is worth from £4 15s. to £5 per ton, and if made from decorticated seed it is worth from £7 to £8 per ton. The oil-cake resulting from 600 lb. of seed would, at the lower figure, be worth about 15s., and the oil about £1 12s., or a total of £2 7s. for oil and cake, the hulls being probably worth two or three shillings more.

Of course, the farmer can stipulate to have the seed, or its equivalent in cash, returned to him.

We have shown how the business would work out generally by shipping to the United Kingdom. Let us point out how a shipment to Japan would result. It has been already mentioned that Japan imports cotton from America to the amount of over one million and a-half pounds sterling, annually.

The freight from Queensland to Japan is 55s. 6d. per ton, or $\frac{3}{10}$d. per lb.—

	£	s.	d.
400 lb. at $\frac{3}{10}$d.	0	10	0
Harbour dues	0	5	0
Outward wharfage	0	0	2½
Cartage	0	0	4½
Agency fee per bale	0	1	0
Dumping „ „	0	1	9
Brokerage in Japan 5 per cent. on £8 0s. 8d. bales of cotton at 5d. per lb.—say	0	8	0
	£1	1	9

These charges added to purchase money, ginning, bale, &c. (£7 8s. 4d.), make a gross outlay of £8 10s. 1d., as against £7 13s. 1d. cost of shipping to England. Taking all the foregoing into consideration, the question now is: Will it pay the farmer to grow cotton at 1¼d. per lb.? If so, will it pay the purchaser to gin it and dispose of it in the Liverpool or Japanese markets? We believe it will pay both, provided that the by-products are utilised. Presuming that this is so, we would go a step further, and that is, in the direction of co-operation If fifty or one hundred farmers in the Northern District, or particularly in West Moreton, were to plant say from 500 to 1,000 acres of cotton, they, by combining to purchase the necessary machinery, such as gins, hulling machine, oil press, &c., could retain in their own hands the

whole of the profits. When agricultural banks are an accomplished fact they could receive assistance to establish a first-class plant, and considering the anxiety of the Government to assist and foster in every legitimate way the agricultural, mining, and manufacturing industries of the colony, there is little doubt that the resources of the Agricultural Department would be brought to bear in some manner on the cotton industry, provided it could be shown that a reasonable expectation of its establishment on a sound footing could be entertained.

In Paraguay, in order to encourage the industry, the Agricultural Bank pays 2s. per arroba (25 lb.) for cotton in the seed, and 6s. 6d. per 25 lb. for ginned cotton as an advance to the cotton-growers.

Experience has shown that the West Moreton and portions of the East Moreton district are eminently adapted for cotton-growing, and if a start is once made, we believe that the industry will be permanent. The population of the United States has increased by 13,000,000 since the last census. The American cotton-mills will therefore utilise many thousands of bales which otherwise would go to Europe. This of itself leaves an opening for Queensland to step in, and we seriously advise farmers to consider the question. The various agricultural societies should obtain all possible data upon it, and discuss it in all its aspects. Having now placed the matter clearly before our readers, we shall await with interest the revival and development of the cotton industry in Queensland. It must be borne in mind that we do not advise farmers to grow cotton; we merely ask them to consider, having the figures before them, whether it will pay them to revive an industry which provided light and remunerative work for their families, which had a sure market, and which consequently added materially to the comfort of the farmers' homes.

In connection with a possible trade in cotton with Japan, it is interesting to note that as far back as 1891 an article appeared in the *Telegraph*, in which Professor Shelton, then Instructor in Agriculture, said:—"In casting about for a present as well as a future market for Queensland cotton, our comparatively near neighbours, the Japanese, call for attention. It may not be generally known that during the last three or four years (1887-1891) a trade of considerable magnitude has been done between New York and Yokohama in the shipment of raw cotton. This cotton is grown in the Southern States, finds its way by sea or rail for thousands of miles to New York, and from there is conveyed by the Canadian Pacific Railway across the continent to Vancouver, whence it is shipped direct to Yokohama, 5,000 miles distant. In this way a business, which in 1888 amounted to 84,257 lb. weight, has increased to 7,072,562 lb. in 1891.* Moreover, London annually furnishes a large supply of cotton, American, for the most part, to the same Eastern market. That this trade is capable of increase, and that Queensland is almost certain to take a hand in it in the near future, facts seem to show plainly. There are 40,000,000 people in Japan who wear cotton garments exclusively, to say nothing of the 12,000,000 in Corea, and the innumerable multitudes of China. Certainly if Queensland farmers take hold of cotton-raising, as to my mind they certainly can and should, the Eastern market will be well worth looking into as an outlet for the crop."

If it can be sold at a profit in Japan after being transmitted from the Southern States to New York and thence by rail and sea to Japan, the Queensland planters should be able to make it pay handsomely.

[I am indebted to Mr. D. Jones, of the Agricultural Department, for much of the information in the above article.—A. J. B.]

*Japan in 1889 took 224,214 bales, equal to about 89,685,600 lb. of American cotton; and 11,000 bales or 4,400,000 lb. went to China.—Ed. *Q.A.J.*

CHILLI PLANTING IN CENTRAL AFRICA.

An ex-Ceylon planter, writing to the *Ceylon Tropical Agricultural*, says concerning the growing of Chilli peppers:—Some time ago I saw a letter in the *Observer* from somebody in Rakwana, inquiring about the cultivation of chillies. I have 100 odd acres planted between the lines of coffee as a catch crop; they are now three years old, and lots are beginning to die off after continuous cropping for two years. After the first crop I cut them down and dug them in as manure to the coffee; they grew up again quickly, and I have now nearly finished a second crop. I intend to uproot and dig them in altogether in the course of a few months more, as the coffee has now closed in upon them and they have served me well, having more than paid for the opening of the coffe-clearing. I could not pick half the crop for want of labour; but I should say each tree gave more than 1 lb. of dry chillies, and the price I got was from 37s. 6d. to 56s. 6d. per cwt. The variety I have planted is the common bird's-eye used by the Ceylon coolie and found growing on most estates wild in Ceylon. This kind, if of good quality, bright and clean, always meets with a ready sale. I have tried other varieties, and capsicums, but there is a very small demand and uncertain market for any kind except the very pungent bird's-eye chillies. Chillies take about eight months before they begin to bear fruit.

And he adds, concerning Australian gums: they grow well, blue and red gums thrive splendidly. *Robusta* trees I have growing over 100 feet high, and 5 feet in circumference, at 6 years' age—I have plants from the seed of those trees 8 feet and 10 feet high at 18 months' age. White ants do an awful amount of damage to gums, causing the death of many plants, and even of well-grown trees.

ARROWROOT AND GINGER.

Mr. W. Castles, of the Logan Butter Factory, who has had extended experience in arrowroot cultivation, whilst writing in very complimentary terms of the November issue of the *Journal*, and commending the idea of publishing the Farm and Garden Notes a month in advance, says:—

"I notice in your Farm and Garden Notes for December you state 'Arrowroot and ginger may be planted.' As one of the oldest arrowroot planters, I found that the earlier we got our arrowroot planted the heavier was our yield of starch. Early in September, we found to be our best planting time, and when we had dry seasons, the largest bulbs were planted. This enabled the plant to be nourished, and to grow up a large and strong plant even in a dry season, and when rain came in those years, sometimes in December, the plant had reached 4 feet to 5 feet high owing to the nourishment obtained from the bulb alone, and we had a heavy crop. We found the arrowroot which, in the seventies, we occasionally planted in December, was only fit for seed. It was so late in flowering that the frost of the ensuing winter had overtaken it before the bulbs could mature, and the result was very little starch, Indeed, our December planting was always intended to provide seed only for the next spring. With regard to ginger, we grew this for years and found out that it is essentially a plant requiring shade. If you notice the wild ginger, the native of the colony, you will always find it in the richest soil and in the deepest shade of our scrubs. After trying for years to grow it by early planting, and having the mortification of seeing it cut down to the surface of the ground by the hot sun, I tried the experiment successfully of planting corn thickly in the rows on the land I intended to plant with ginger, and when the corn had grown high enough to give sufficient shade I planted the ginger in rows between the rows of corn. I did not allow the corn to remain longer than the ginger required the shade, but cut it down for green feed. Ginger requires rich land, and allowing the corn to mature would injure the ginger crop by robbing the soil."

We quite agree with Mr. Castles as to the time for planting arrowroot. In the early days he speaks of, we planted arrowroot in September, and heavy crops resulted. In our October issue of the *Journal* we recommended planting in October (The Field, in October). But circumstances will occur in farming which often make it impossible to do the right thiug at the right time. The mill may break down in August, at the height of the season, or heavy rains may set in, rendering it impossible to get on to the land with horses. What we had in view in stating that arrowroot might be planted in December, was to point out that that month is not too late for planting, although possibly the resulting crop might be deficient in starch.

Those who are planting ginger would do well to note what Mr. Castles says about shading the young plants.—Ed. *Q.A.J.*

THE SUGAR INDUSTRY IN 1899-1900.

With the advent of Dr. Maxwell, a new era is about to dawn on the sugar-growing industry of Queensland. The doctor comes armed with the highest credentials which any scientist can possess. Not only has he succeeded in greatly increasing the production of cane and of sugar in Honolulu, but he has also been the means of increasing the productions of agriculturists generally, and has even turned his attention to the science of forestry. But it is more particularly as a scientist in cane production that our interest will attach to his work here. To enable us to appreciate in some degree what will be the value of that work to individual canegrowers, to sugar manufacturers, and to the colony as a whole, let us consider a portion of the Registrar-General's report on agricultural statistics to the end of the sugar season of 1899. In that year 110,657 acres were under cane cultivation, and of that area 79,435 acres were crushed for sugar. The average tonnage of cane produced per acre was 14·81 tons. Doubtless there were areas on which a heavier crop was grown, but for statistical purposes it is necessary to consider the industry as a whole. The number of tons of cane required to make a ton of sugar was 9·54 tons, being the average for the whole colony.

Now, if the production of cane on those 79,435 acres could be increased to only 24 tons, the result would be an addition of £5 per acre to the growers, reckoning cane at 10s. per ton, or a total of £387,175 over and above what they actually received. A further result would be that the output of sugar from the mills would have been increased by 79,435 tons, which, at £8 per ton, would represent a value of £635,680.

These figures seem incredible, yet see what is done in Java. There the returns are given of 39·3 tons of cane per acre, the produce of which gave $3\frac{9}{10}$ tons of sugar per acre.

For the purpose of comparison, let us reduce these quantities to a cash value on the basis of Queensland prices, taking our last year's return of acreage crushed: 79,435 acres at $39\frac{3}{10}$ tons of cane per acre gives a yield of 3,214,117 tons which, at 10s. per ton, represents £1,607,058, with a resulting sugar yield of 357,124 tons of a value at £8 per ton of £2,856,992.

Is it possible to restore the worn-out soils of many of our sugar districts to the extent of enabling them to yield 40 tons of cane? Most things are possible to science, and if our alluvial soils were once able, and if some are actually able to-day to produce from 50 to 70 tons per acre, there seems to be no reason to doubt, that when the impoverished soils have been subjected to strict analysis, there will be found to exist in the hands of the scientist a power which, aided by the hearty co-operation of all interested in the sugar industry, will be able to greatly increase the fertility of such soils, and, as a consequence, to add considerably to the wealth of individuals and of the colony at large.

SUGAR EXPERIMENT STATION, MACKAY.

Report on Crops for Month ending 31st October, 1900.

Name of Crop—Block.	Planted.	Area.	Drilled or Broadcast.	Manure Applied.		Rainfall during Month.	Treatment during Month.	Growth during Month.	Remarks.
				Name.	Per Acre.				
		Ac'rs							
Sorghums and Millets ... A2	3-9-00	·12	Drilled	...	...	...	Disc harrow and weed	Very little	
Sorghum A2	28-4-00	·20	...	...	...	...	...	...	All cut for horsefeed.
Velvet Bean ... ... A3 and A4	9-10-00	...	...	...	...	...	...	Nil	
Cane A5, B5, C5	24-8-00	1·70	...	...	...	...	...	Fair ...	Suffering from dry hot winds and continued dry weather. A5 only yielded fairly.
Small Mauritius Bean ... B1	...	·60	Self-sown	...	...	...	...	,,	
23 Trial Rows of Sorghum, &c. B2[1]	...	·14	Drilled	...	..	...	Irrigated and weeded	Good ...	Details given last month.
Velvet Bean ... ... B2[1]	...	·36	Self-sown	..	...	...	...	Fair	
Small Mauritius Bean ... B2[1]	...	·10	,,	...	...	...	...	Very little	
Small Mauritius Bean B3 and B4	14-8-00	3·50	Sown after plough	...	...	...	...	Very good growth	In spite of dry weather this crop s making good growth.
Small Mauritius Bean C2, 3, 4	14-11-99	1·36	Drilled	...	...	...	...	...	This still covers the ground. Last seed been collected 3rd November. Abundance of seed opened on paddock, so when rain comes, and crop is ploughed in, we should get a good crop.
Cow Pea ... ... Outside	25-4-00	·75	,,	...	...	...	...	...	Everything turned in.
Grape Vines B3	...	...	...	...	...	...	Irrigate and work, Planet Junior and stop	Very good	
Orange Trees B1	...	...	...	...	...	...	Water and weed round these	Good	
Pineapples B0	...	...	...	...	...	...	Weeded	Very good	
Cane B0	5-5-99	1·10	...	...	...	...	Nil	Nil ...	Most miserable crop.
,, Yuban ... Lab. paddock	20-6-00	...	...	..	..	...	Weeded	Good ...	Very good stand and healthy.
,, ... D74	13-8-00	...	...	...	...	...	,, ...	,,	Healthy growth.
,, N.G. Collection	0-5-99	...	..	...	...	...	...	Very little growth	

REPORT ON EXPERIMENTS FOR MONTH OF OCTOBER, 1900.

Purpose of Experiments.		Name of Crop Experimented upon.	Area.	Planted.	Drilled or Broad-cast.	Manure Applied.	Method of Application.	Treatment during Month.	Rainfall during Month.	Growth during Month; with Details of Results of Experiments and Remarks.
			sq. ft.							
Cane as previously detailed	1	...	1·46	...	...	As detailed previously		Watered and weighed	...	Best growth.
	2	...								Little better than 6.
	3	...								do. do.
	4	...								Very little inferior to 6.
	5	...								do. do.
	6	...								
	7	...	...	..	...	None.				

For Month of October—

During the month the average loss of water from boxes with cane ... ... 42·75 lb. = 5·63″ of rain
Loss of water from box No. 7 ... ... 32·62 lb. = 4·296″ rain

Water used by plants ... ... 10·13 lb. = 1·335″ of rain

Forestry.

WOOD FOR VENEERS.

Many of the scrub timbers of Queensland are so beautifully figured and variegated that the most exquisite veneers may be cut from them. It needs only a visit to the Technological Museum at the Department of Agriculture to verify this. There may be seen rough and highly polished specimens of many beautiful timbers—timbers which are daily being recklessly cut down and burnt. The scrub is required for agriculture, the timber cumbers the ground, and so thousands of pounds' worth of timber are destroyed which has been valued in the British markets at from 1s. 3d. per cubic foot for yellow-wood to 3s. 9d. per foot for brigalow, and 4s. 6d. per foot for rosewood. These prices were actually obtained for a shipment of scrub woods in 1879. Ironbark was also sent, and fetched 1s. 9d. per foot; and spotted gum 1s. 6d.

Every 20-foot log of rosewood was worth £6 15s. How many thousands of rosewood trees and brigalow have been dissipated in smoke in this colony? Timber is getting scarcer every year all over the world, and prices are becoming steadily higher.

Time was when African mahogany could be obtained as cheaply as our cedar. At a sale recently held at Liverpool by Messrs. Edward Chaloner and Co., two logs of African mahogany were sold for £1,536. They were off the same tree, and were bought to be cut into veneers to decorate the walls of some magnificent houses of American millionaires. The prices realised for the two logs were respectively, 10s. 3d. and 7s. 3d. per *superficial* foot.

This will give some idea of the value of beautifully marked hardwood suitable for veneers, and we have numerous exquisitely figured timbers in our scrubs and forests.

FOREST CONSERVANCY IN NEW SOUTH WALES.

The subject of forest conservancy has at last been earnestly taken up in New South Wales. All interested in the timber trade have come to the conclusion that one of the most valuable assets of the colony—the forest timber—is in danger of being lost owing to the laxity of the forest laws. The outcome of this has been a conference of saw-mill owners, timber-getters, timber merchants, sleeper-getters, squarers, log-haulers, and others interested in the timber industry of New South Wales. At this conference it was unanimously agreed that new legislation is imperative in this direction, and it was pointed out that the forest lands of New South Wales represent an asset of £150,000,000, present and prospective. It was urged, as we have frequently urged in this *Journal* with respect to our Queensland forests, that all forest lands should be reserved from sale. It was shown that out of some 30,000,000 or 40,000,000 of acres of forest land only 5,900,000 acres have been reserved. and that such lands are being alienated and depleted of their wealth of timber, thus destroying a valuable national asset. It was said that forest lands are not adapted for pastoral occupation. We confess that we do not understand this statement. If by forest lands, scrubs are meant, we may agree that such lands are utterly useless for pastoral settlement, but not that they are unfit for agricultural purposes. Our very best Queensland agricultural land is found in the scrubs. But the same scrubs contain most valuable timber, and doubtless, would prove more valuable to the State if conserved as forests than if alienated irrevocably at 2s. 6d. per acre as homesteads.

Attention was drawn to the enormous areas reserved as forests in the United States, but it must be remembered that much of the country reserved under the name of "forests" in the States is really devoid of timber. The use and application of the word "forest" require explanation. It should only be applied to timber of merchantable size suited for saw-logs and not to fire-wood, brush, dead timber, &c. The forest reserves of the United States cover 38,880,000 acres, or 60,000 square miles. Many reserves consist of nothing but chapparal, and in California alone there are 2,000,000 acres reserved as forests which do not contain enough timber for clothes props, and, on the other hand, there are magnificent forests on the San Francisco and Mogollon Plateaux, covering thousands of square miles of magnificent Douglas pines, of which not an acre has been reserved.

In Queensland, 162,877 acres are reserved as State forests, but the area of the timber reserves amount to 1,508,374 acres, but, as in the United States, these are reserved for other purposes besides forestry. Some areas, in fact, contain nothing worthy of the name of timber. The Southern colony would now appear to have risen to the occasion, and to be prepared to take vigorous measures for the protection, conservance, and propagation of the forests, and we have authority for stating that Queensland is no less alive to the danger of the depletion of her timber lands, and that prompt measures will be taken by the Department of Lands to ensure their immunity from destruction and waste.

The following is the text of the proceedings at the New South Wales conference:—

TIMBER AND FORESTRY LAWS.

IMPORTANT CONFERENCE IN NEW SOUTH WALES.

Some Valuable Suggestions.

The following is the list of resolutions adopted by the conference of those interested in the timber trade in New South Wales:—

The conference desires to submit that there are disabilities which those engaged in the industry labour under, which can be removed by Ministerial action, and there are other aspects of the question which will require new legislation. The conference was of opinion:—

1. That the Forestry Department be placed under a board or commission of three members, for the following reasons:—(*a*) That the forest lands of New South Wales represent a national asset, present and prospective, of £150,000,000; (*b*) that the necessary attention could not be paid to this great question except by expert administration; (*c*) that valuable by-products can be obtained from the waste timber—namely, oils, dyes, and perfumes—which would add to the national wealth.

2. That all forest lands should be reserved from sale. It was pointed out (*a*) that New South Wales contains about 30,000,000 or 40,000,000 acres of forest land, whereas only 5,900,000 acres have been reserved; (*b*) that some of the best of our forest lands are being alienated or depleted, thereby destroying a valuable national asset; (*c*) that forest lands are not adapted for pastoral or agricultural purposes, but would return more to the State as forests. We would therefore urge that, in view of the areas set apart in other countries for forestry purposes, a survey and classification of our lands should at once be made, and some 30,000,000 acres at least be dedicated to forestry.

3. That this conference protests against the destruction of valuable timber by the inexperienced unemployed on travelling stock reserves. It was urged (*a*) that, inexperienced persons being placed in charge, the most valuable timber was destroyed by felling and ringbarking; (*b*) that large quantities of pine and hardwood were being ruined by the unemployed in the north-west on travelling stock reserves.

4. That the forest lands be classified—namely, cedar and brushes. Hardwoods on the north south-east of the dividing range; hardwoods on south coast, west of the range; hardwoods west of the range. Pines on the Richmond, and

Murray are cypress pines. It was suggested (*a*) that district regulations be adopted for each district; (*b*) that the northern district might be subdivided into sub-districts; (*c*) that as similar timbers possessed different characteristics in each district, special regulations should be applied to each.

5. That no forest lands be alienated; (*a*) it was deemed necessary that the whole of our timber lands should be retained as forests.

6. That no concessions of land be granted to persons, syndicates, or companies, for the purposes of saw-mills or timber-cutting to the exclusion of those engaged in the timber industry. It was urged (*a*) that persons engaged in the industry had expended large sums of money in plant, &c., and that it would be unjust to give a monopoly of the forest lands to any person to the exclusion of those engaged in the industry.

7. That there should be a uniform license fee charged and royalties, such royalties to be collected upon the output of the mill with regard to sawn timber, and from exporters with regard to squared timber and lumber, and not collected from men in the bush.

8. That there shall be no limit to the cutting girth of marketable timber, excepting in the case of ironbark.

9. That the holders of grazing leases should not be allowed to cut or remove any timber for sale.

10. That the unlimited authority placed in the hands of forest rangers had been inimical to the industry.

11. That the royalty regulations gazetted to come into force on January 1, 1901, would mean the disorganisation of the whole timber trade of the colony, and would reduce the earnings of those persons working under it below a living wage, thus affecting thousands of women and children, and would necessitate a host of additional foresters.

12. That the provision requiring a timber-cutter to carry a license on his person should be eliminated.

13. That small ironbark should not be cut for telegraph poles where other timber is available of equal suitability and price.

14. That the Narrabri reserve, No. 24,588, be resurveyed, as the timber is nearly cut out, and cutters cannot pay 3d. per sleeper.

15. That in the south coast districts no wattle tree shall be stripped of its bark which is not 12 inches in circumference at its butt, 2 feet from the ground, and that on all wattle trees a strip of bark at least 2 inches in width shall remain uncut in order to allow the tree to remain alive and continue to grow.

16. That greater care should be exercised in condemning timber.

17. That timbers other than ironbark be specified for use by the Government. Ironbark is specified in nearly every contract, whereas other timbers are equally or more durable. The main claim to ironbark is that the breaking strain is greater than other timbers, its breaking strain being 17,900 lb. to the square inch, compared with 11,900 lb. for English oak, and 15,500 lb. for teak. Thus ironbark was a valuable timber where a tensile or breaking strain was required, but other timber was equally valuable for other parts of the work.

18. That in districts where large quantities of timber exist, and where considerable difficulty is experienced in removing the same, the Minister for Works be requested to construct roads into such forests.

19. That the holder of licenses or permits should be allowed to reside on Crown lands during the time he is the holder of such permit or license; also that he be allowed to graze such stock thereon as are employed in removing timber.

20. That an import duty should be imposed on all foreign timbers.

21. That the excessive waste and cost of ironbark sleepers would be very much lessened, and the price of all sleepers economised by the Railway

Commissioners substituting in all future contracts for railway sleepers sawn sleepers, as the present mode of procuring ironbark sleepers is most wasteful and expensive.

22. That the minimum cutting girth of ironbark trees east of the Dividing Range be reduced from 7 feet 6 inches to 5 feet, and west of the range to 3 feet. Also that mill-owners and other persons be permitted to leave fallen timber in the forest for six months instead of three as at present. That forest rangers should be required, in the event of any timber being seized, to post a notice by registered letter to the owner of the timber, acquainting him with the fact of such seizure. That no penalty incurred for infringement of the regulations should be less than 20s. or more than £5. (The royalties agreed to by the conference on various timbers, as published, were given.)

23. That section 115 of Act 48 Vic. No. 18, be amended by the omission of the words "At an annual fee of not less than £6, and a proportionate fee for shorter terms," with a view of inserting the following words: "Subject to such fees as the Governor may provide by regulation."

In reply to these resolutions, the Minister for Lands said he was very pleased that a conference had been held on such an important question. The Forestry Department required something to put it into shape, when once it had been reorganised. The opinions and suggestions of such a practical body of men as the timber delegates would be of great value in that connection. Had the department been kept under one head, possibly so many complaints would not have arisen, but it had been passed from one head to another, and since it came under his control he had hardly time to look into it. There would have to be entirely different management in the department. The forests of the colony constituted a great national asset, and should bring in nearer £50,000 than £10,000 per annum, because our timber was very valuable. The industry, in his opinion, was yet in its infancy. The Premier and he had had a conference on the subject, and they might rely that steps would promptly be taken to put the industry on a better footing. The suggestions of the conference would receive the most careful consideration at his hands, and the specific cases submitted would be dealt with promptly. He thought the better plan would be not to attempt to alter the regulations clause by clause, but to leave the whole matter for the consideration of the board it was suggested to appoint. He would not bring the proposed new regulations into force on January 1, but would leave them in abeyance until the whole question was considered. With regard to the forest rangers, he agreed that it would be far better if good practical men were appointed to those positions. He thought thanks were due to the delegates for the time, trouble, and expense they had been at in attending the conference, and sincerely hoped their deliberations would result in benefit both to themselves and to the State. He was fully impressed with the desirableness of placing the management of the forests in the hands of a board.

SCIENTIFIC FORESTRY IN SWEDEN.

Scientific forestry in Sweden is a profitable venture, according to a recent consular report. There are now in Sweden 18,000,000 acres of public forest, of which 12,500,000 acres are under scientific management. The export of foreign products in 1897 amounted to $97,662,700. There is, in Sweden, a central forestry bureau, a forestry corps for work in the field comprising 9 inspectors, 88 chiefs of range having equal rank with captains in the regular army, besides many foresters and watchmen. The State forests average 166,250 acres in each range. There are a college of forestry and six schools of forestry. For forestry management, administration, and instruction, the State annually expends, according to the report of 1898, $423,659. The income to the State from forestry the same year was $2,104,412; the forest at the same time growing more valuable every year.—*American Engineering News.*

Entomology.

CARPENTER BEES.

We have received the following very interesting letter on the subject of the so-called carpenter bees from Mr. J. Thorneloe Smith, together with an explanatory letter from Mr. Harold Hockings, addressed to Mr. De Vis, curator to the museum. We submitted both letters to Mr. Henry Tryon, Entomologist, and he has courteously supplied valuable information concerning these remarkable insects. Mr. Smith says :—

I have a diary note for 30th September, 1888, to this effect—" a splendid native bee discovered on the Wistaria, dark bottle-green, with honey-bag and everything complete, twice the size of the Italian bee." I sent several specimens to Mr. De Vis, who, not knowing how to place them, came to the conclusion that Mr. H. Hockings would be able to inform him with the result seen in his letter. I wish to say that I never saw this description of bee before in Toowoomba or anywhere else, but in my gardens at " The Laurels" there was a splendid bloom of Wistarias, and I noted the sudden appearance of one or two which had increased in a week to several hundreds, perhaps. They went away on the bloom ceasing, and did not appear again except in ones and twos, ceasing altogether, I think, in the fourth year. The colour of the bee (blue black) is very brilliant; the body of the bee is larger and rounder, more like the humble bee of England in that respect. If the old letter is of any use to you I shall be glad ; the date fixes the first appearance of that insect as far as the oldest inhabitant is concerned, for I made exhaustive inquiries ; and although seen that year, not before.

P.S.—I think the living *in pairs* perhaps doubtful, as they did not appear to associate in that way.

By the bye, I should say this—the ordinary bee, the Italian bee, and common black bee appeared to find a difficulty in extracting the honey from the Wistaria, but this bee had no difficulty, as its extracting proboscis is considerably longer.

To this Mr. Hockings replied :—

I am sorry to say that I am unable to give the name of the bee, but it is a borer, and appears to live in pairs ; they chiefly rear their young, which they feed on balls of pollen, on which the eggs are laid, in nests cut into the flower stalks of the grass-tree, in the form of galleries. As each of the eggs is laid, it is partitioned off with sufficient pollen balls to form food to bring it to maturity. It takes two months to emerge from the egg to perfection. I have not determined the period exactly. I have at times known it to bore into other trees in a state of decay, or which were of such a nature in the wood as to permit them to do so. The partitions in the brood nest are formed out of strips torn from the inside of grass-tree stems or pulp. In other cases they generally use a piece of leaf to close the external entrance stuck with a piece of gum.

Commenting on these letters, Mr. Tryon writes :—

The insect described in general terms by Mr. T. Smith, and whose breeding habits are detailed by Mr. H. Hockings in so interesting a manner, is doubtless *Lestis bombylans*, Fabr., one of the long-tongued solitary bees. This bee—that is not uncommon in Southern Queensland—was amongst the Hymenoptera obtained by the great naturalist, Sir Joseph Banks, in Australia on the occasion of Cook's visit, and was described shortly after that event by Fabricius. It was not, however, until 1851 that an account of its method of nidification in the stems of grass-trees was published by the late Frederick

Smith. There are other examples of these so-called carpenter bees in Queensland; but these, for the most part belong to the allied genus *Xylocopa*. Indeed, for a long time the fact that the present insect was referable to a group distinct from the latter was lost sight of: a circumstance that is commemorated in the Greek word *Lestis*.

The progeny of a single pair may, for some time subsequent to their development as winged insects, visit flowers in company and even sleep side by side on the dead twigs to which they are wont to resort, but their gregarious habits do not extend beyond this. Moreover, they never store honey, and in this respect also differ from the social hive-bees. As Mr. T. Smith's remarks suggest, they are structurally adapted for securing the nectar of blossoms that is inaccessible to ordinary bees and other insects, and hence may be effective pollenisers of flowers that would not set seed in the absence of their visitations; moreover, they minister to the same purpose in being—in the case of the females, at least—extensive gatherers of the pollen itself. Where carpenter bees, such as those, are numerous and standing trees are scarce, they may prove injurious to wooden structures generally, as I am informed—by H. A. Koebele—is the case in the Sandwich Islands. Neither Mr. Smith nor Mr. Hockings has alluded to a striking feature presented by *Lestis bombylans*—that is, the marked dissimilarity between the two sexes; the males, whilst differing also in other respects, being brassy-green instead of blue-green, and having, moreover, four large and conspicuous patches of bright-yellow pubescence on their thorax, whereas their consorts possess an almost uniform livery.

GUNNING TO PREVENT HAIL.

In the *Pacific Rural Press* of 17th February last, a description was given of an Italian method of shooting cannons into the air toward clouds supposed to yield hail, and thus preventing such destructive downfalls. John C. Covert, U. S. Consul at Lyons, writes to the State Department of an effort being made in a section of France to dissipate hailstorms by firing cannon at the clouds. Fifty-two cannon, manned by 104 cannoneers and their chiefs, have been distributed over an area of 2,500 acres of rich vine land. For the expense of the experiment the Government appropriated 386 dollars, the Department Council 289 dollars, the National French Agricultural Society and a number of wealthy wine-growers added 2,316 dollars, and furnished fourteen more cannon. The Minister of War supplied powder for 2¾ cents per lb.

A high point in the vine land to be covered by the experiments was elected as the central post of observation, and a signal code adopted. When a shot is heard from the central post all the cannon are fired, at first twice per minute; more slowly after the first ten shots. I translate the report of the first firing at the storm clouds this season: "The farmers of Denice were aroused at 1·30 o'clock on the night of June 5-6. The storm was very severe. The artillerists, from forty to fifty strong, fired their guns and stopped the thunder and lightning. In the neighbouring communes the people saw columns of flame rise 300 feet above the cannon when the shots were fired. At several places women re-charged the cartridges."

The wine-growers are organising to attack the hailstorms in many of the great wine-growing regions of France. The two experiments thus far reported are pronounced successful. A writer in one of the wine-growers' organs writes: "The results obtained from these experiments are such that organisations will be established at once in all the places that have been heretofore ravaged by hail."

I am told that the practice of shooting at the clouds was known in France over 100 years ago, and that it originated in Italy. It is to be more extensively carried on this year than ever before.

Plate LXXI.

Lipoma or Fatty Tumor. Interior View of Fatty Tumor.

(Half Natural Size).

Animal Pathology.

MORBID SPECIMENS SUBMITTED.

Tumour (Lat. *tumor*, "a swelling") is the term applied in medicine to new formations characterised generally by their "independent growth and almost independent life, so little do they appear to concern themselves with the interest of the body as a whole"; "their tendency to continuous growth"; and "the tenacity with which they maintain their hold upon the individual, rarely disappearing or even diminishing in size."

They are thus separated on one hand from simple hypertrophy of organs normally present, and on the other from inflammatory swellings and the enlargements associated with actinomycosis, tubercle, glanders, &c. Many cysts, however, though grouped with tumours, are merely enlargements of normal cavities.

The most important divisions of tumours is that into *Innocent* or *Benign* and *Malignant* tumours.

Malignant Tumours tend (*a*) to grow continuously into the tissues surrounding them, irrespective of the natural boundary lines between different structures; (*b*) to recur after removal; (*c*) to cause secondary growths of the same nature in the neighbouring lymphatic glands, (*d*) and in distant parts of the body; (*e*) they are dangerous, and certain sooner or later, if unchecked, to destroy life.

Innocent Tumours, on the other hand, are sharply marked off from the surrounding tissues, tend to grow by pushing aside rather than by invading adjacent structures, do not return after removal, and do not lead to the occurrence of similar growths in other parts, though several or even many of them may be present in the same patient. They may cause death by interfering, on account of their situation, with the function of important organs, by becoming the seat of ulceration and hæmorrhage, &c., but they have not the intrinsic dangers of the other group of tumours.

With regard to causes of tumours little is known. In some cases they can be traced to the effects of injury or of long-continued irritation of a part, though the reason why they should so arise in a particular individual is often inexplicable, and in some cases heredity seems to be an important factor in their occurrence. But in the large majority of cases they are formed without any apparent cause.

Further, these morbid growths, as a rule, are met with in making *post-mortem* examinations; there are seldom any symptoms indicative of their presence during life. (Plate LXXI., Figs. 1 and 2.)

During the process of dressing a pig a tumour, weighing 14 oz., was noticed, suspended or pocketed between a portion of the small intestine (inflated, seen in front of the tumour) and the mesentery (a membranous curtain which serves to retain the intestines in their place—this membrane is shown at the top and back of the tumour). On examination it proved to be a *fatty tumour*, technically known as a *Lipoma*.

Physical Characters, &c.

A *Lipoma* is a localised and circumscribed formation of fat, more or less lobulated, surrounded by fibrous capsule through which numerous blood-vessels are distributed, and from which in most cases it can be easily unnucleated or "shelled out."

On section they present the appearance of fat, with more or less dense fibrous tissue running through its substance and breaking it up into *lobules* or areas of fat (Fig. 2).

Lipomas spring from *connective tissue*, so its seats of growth are as extensive as the distribution of this tissue over the animal body.

Fatty tumours are quite *innocent;* they grow slowly, but may obtain huge size. Sometimes these tumours become pedunculated, and are thus liable to strangulate the intestine by entwining their necks around it.

These tumours cannot be diagnosed during life. (Plate LXXI., Fig. 3.)

This plate represents morbid growths in a spleen obtained from a pig, the abnormal condition being termed *Lymphadenoma.*

Physical Characters, &c.

Lymphadenoma of the spleen (Plate LXXII.) is a new formation, which comes under the heading of those lymphomatus growths known as *Lymphomata.* The *Lymphomata* occasionally, however, exhibit malignant properties. To these malignant forms the term *Lymphadenoma* is sometimes applied. They correspond with Virchow's *Lympho-sarcoma.*

The tumours are found as greyish or yellowish white colour masses of about the size of a cherry or sometimes considerably larger, as seen in Plate 3, in consistency from moderately firm to almost cartilaginous, and they are more or less irregular in shape.

When examined microscopically, we have found these tumours of the spleen to be composed of an *adenoid reticulum*, or a network of homogenous fibrils, the meshes of which are completely occupied by numerous cells—lymph corpuscles.

In the spleen the new growths originate in the Malpighian bodies—round, whitish semi-opaque corpuscles disseminated throughout the splenic pulp.

On pathological grounds it should be distinguished from tubercle, for which it has been often mistaken. *Lymphadenoma* has little or no tendency to metamorphosis, whereas tubercular growths readily undergo a process of degeneration.

There are no diagnostic symptoms by which these tumours can be recognised during life. They are, however, not unfrequently accompanied by anæmia, depraved appetite, and loss of flesh. Other morbid growths of the spleen are cancer, melanotic growths, and lardaceous degeneration met with in animals slaughtered at the various meat-preserving establishments, and these conditions will be described as specimens are obtained.

DESTRUCTION OF BACTERIA IN MILK.

It is reported from Vienna that one of the scientists there has discovered that all the bacteria in milk may be easily killed by means of electricity, and a very moderate current at that. It is declared that the treatment is simple. This is of immense value to the human race, if true. It means that milk can be sterilised without the application of heat. It would not only place in the hands of dairymen the means of making better butter, but it would make the pasteurisation of the private milk supply popular, thereby decreasing all the diseases whose germs are carried in the milk.

Plate LXXII.

Lymphadenoma of the Spleen (*Reduced*).

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

Table Showing the Total Rainfall for each Month of the Year in the Agricultural Districts of Queensland.

Stations.	1899.				1900.								
	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
North.													
Bowen	0·06	0·56	Nil.	2·92	7·61	0·40	0·88	0·59	0·89	1·14	0·96	0·76	0·12
Cairns	3·23	0·74	0·33	4·57	43·06	1·98	8·90	3·77	3·56	1·66	0·20	Nil.	2·44
Geraldton	9·03	1·03	Nil	4·89	62·26	2·36	8·86	8·86	8·33	2·34	1·02	Nil.	2·63
Herberton	1·62	0·18	2·75	0·73	11·90	0·23	1·97	2·19	0·57	0·12	0·98	Nil.	0·74
Hughenden	Nil.	0·45	1·05	0·33	6·43	1·04	0·01	Nil.	0·11	0·02	2·45	Nil.	0·14
Kamerunga	...	...	...	...	...	1·01	8·60	3·25	3·65	Nil.	0·18	0·03	1·42
Longreach	0·06	0·27	0·67	Nil.	1·68	0·48	Nil.	Nil.	0·14	Nil.	2·34	0·50	Nil.
Lucinda	0·97	0·02	1·26	1·02	37·35	1·71	4·90	4·44	9·08	1·10	1·04	0·08	0·44
Mackay	1·33	0·19	0·49	7·65	20·86	0·65	4·12	2·40	2·89	2·00	3·25	0·74	1·19
Rockhampton	1·96	2·35	1·22	11·02	4·53	0·25	1·64	0·93	1·38	0·71	1·70	0·92	2·52
Townsville	0·01	0·35	0·16	0·53	21·09	0·07	1·68	0·87	2·31	0·41	0·57	0·12	0·25
South.													
Barcaldine	0·27	0·94	0·52	0·04	3·08	0·65	0·09	2·03	1·38	0·29	4·38	1·63	0·03
Beenleigh	3·11	2·53	1·80	7·40	5·42	3·19	3·16	1·25	7·55	2·18	4·77	1·06	1·90
Biggenden	...	...	...	...	...	0·40	2·81	0·28	3·06	1·43	3·23	0·98	3·07
Blackall	0·16	1·20	0·04	0·85	1·73	1·31	0·63	0·63	2·19	0·33	2·21	0·66	0·12
Brisbane	2·48	2·26	2·33	7·61	6·51	5·18	3·37	1·38	5·45	2 68	4·36	0·79	1·52
Bundaberg	1·67	1·60	0·06	7·62	4·63	0·86	1·86	1·15	3·97	1·46	5·20	1·14	1·56
Caboolture	2·40	2·30	2·23	7·44	3·04	4·18	5·66	1·42	7·04	2·14	3·73	1·56	2·94
Charleville	0·55	0·36	0·43	0·16	1·01	0·08	0·79	Nil.	1·15	1·31	1·80	0·13	0·59
Dalby	1·20	1·44	1·84	2·89	0·41	6·31	2·80	2·46	2·54	1·29	1·70	1·72	1·67
Emerald	1·96	1·93	1·32	0·40	3·08	1·22	3·97	0·42	2·72	1·15	3·96	0·52	0·35
Esk	2·79	2·67	2·25	5·34	1·42	2·34	4·73	1·50	4·78	1·89	2·85	1·39	...
Gatton College ...	2·19	2·13	3·50	5·87	2·40	4·07	3·13	2·24	4·24	1·15	2·73	1·33	2·81
Gayndah	1·24	2·73	4·59	7·37	2·52	2·07	1·11	1·22	2·57	0·88	3·36	1·42	3·28
Gindie	...	...	...	...	...	0·57	1·04	0·96	3·01	0·92	3·01	0·55	0·22
Gympie	2·11	2·41	0·39	6·44	5·59	1·84	2·76	1·05	3·63	0·82	3·34	0·84	5·67
Ipswich	2·77	2·04	3·46	4·66	2·79	1·66	1·85	1·47	4·73	1·45	2·25	1·17	1·37
Laidley	5·04	3·17	2·40	6·50	0·64	3·15	2·87	1·94	4·36	1·41	2·28	1·08	...
Maryborough	2·29	1·20	0·51	4·13	4·88	1·78	3·26	1·17	4·33	1·21	4·32	0·57	3·55
Nambour	3·13	2·87	3·03	11·11	4·07	5·64	4·67	2·78	7·77	1·35	3·42	1·81	4·15
Nerang	4·74	1·99	1·42	6·31	4·60	3·37	3·06	0·47	18·28	2·84	7·74	1·08	2·79
Roma	0·55	0·35	1·27	0·99	0·43	1·52	4·40	0·23	2·07	2·14	2·14	1·05	0·77
Stanthorpe	1·63	1·36	0·86	3·22	2·62	4·81	1·87	1·70	3·17	1·22	2·26	1·50	3·98
Taroom	1·55	0·83	3·32	0·65	1·78	3·65	2·92	2·11	2·55	1·40	2·46	2·94	2·26
Tambo	0·27	0·79	0·08	0·66	2·28	1·55	0·30	0·02	2·94	1·49	1·75	0·59	0·19
Tewantin	2·80	3·36	0·46	8·22	1·69	4·87	5·36	1·02	5·90	3·03	5·89	1·97	5·78
Texas	1·72	0·97	0·74	2·67	1·56	3·39	1·63	1·48	3·35	1·86	2·72	0·66	2·68
Toowoomba	3·15	1·43	2·36	4·75	1·01	2·90	2·87	2·00	4·67	1·69	2·47	1·35	1·95
Warwick	1·99	2·48	1·67	3·83	1·84	4·19	1·93	1·01	3·31	1·23	1·99	1·11	2·72
Westbrook	...	...	...	...	...	3·71	1·78	1·81	3·04	1·16	1·85	1·18	0·60

A. W. ANDERSON,

Acting Government Meteorologist.

QUEENSLAND PRODUCTS IN BRITISH MARKETS.

Butter.—Australian, 110s. to 112s. per cwt.; Dutch, 104s.; Danish, 116s. to 124s.; Russian, 94s.; Canadian, 106s.; Normandy, 116s. to 126s.

The market for Australian butter remains at a satisfactory level, but it is barely maintained.

Cheese.—American, 25s. to 54s.; Canadian, 30s. to 55s.; Colonial (New Zealand), 52s. to 54s. per cwt.

Sugar.—Refined, £16 to £17 per ton; Syrups, £10 10s. to £11 10s.; German beet, 88 per cent., 11s. 11d. per cwt.

Syrups.—4s. 9d. to 14s. per cwt.

Molasses.—5s. to 5s. 6d. per cwt.

RICE.—Rangoon, 7s. 4½d. to 7s. 7½d. per cwt.; Japan, 13s. 6d. to 14s.; Java, fine to finest, 15s. to 17s.; Patna, fine, 20s. to 24s.

COFFEE.—(Duty paid) Ceylon plantation, 118s. per cwt.; Peaberry, 125s.; Smalls, 85s.; Santos, 46s. to 62s.; Mocha, 85s. to 108s. to 135s.; Jamaica, 50s. to 91s. to 130s.

ARROWROOT.—St. Vincent, 2½d. to 5d. per lb.; Natal, 6½d. to 8d.; Bermuda, 1s. 6d. to 1s. 9d. to 2s.

WHEAT.—New Zealand, 28s. 3d. per 496 lb.; Victorian, 33s. 6d.; Russian, 30s. 6d.; Manitoba, 34s.

The *Mark Lane Express* of 1st October says:—"A cargo of Indian wheat was sold for April shipment at 82s. 3d. per qr., a price indicating a strong confidence in the course of trade after 1901 is once reached.

MALTING BARLEY.—26s. to 40s. for choice lots per 448 lb.

OATS.—New Zealand, 26s. 6d. to 29s. per 304 lb.; Canadian, 16s.

GINGER.—Jamaica, £3 10s. to £4 per cwt.; Bengal rough, 27s. to 28s. per cwt.; Japan, 23s. to 25s. per cwt.

PEPPER.—Capsicums, 20s. to 90s. per cwt.; chillies, 37s. to 43s.

TOBACCO.—Prices are still unchanged.

WINE.—Australian Burgundy, 13s. per dozen bottles; Waratah, 18s. per dozen; fair, red Australian claret in bond, 2s. to 2s. 6d. per gallon; fine old quality, 4s. 6d. per gallon. The trade in Australian wines is not suffering the diminution observable in some of the other branches. The first seven months of the year show an increase of 5,223 gallons.

GREEN FRUIT.—Bananas, 12s. to 14s. per bunch; pineapples, 3s. to 5s. each; grapes, Almeria, 6s. to 11s. per barrel; choicest, 17s. to 19s. per barrel; oranges, Naples, 8s. to 12s. per box; lemons, Naples, finest, 32s. to 35s. per 420.

COTTON.—Sea Island cotton is worth in the seed in Florida 2d. per lb., or 8d. per lb. for ginned cotton; clean uplands, in London, 6½d. per lb.; in Japan, 4½d. per lb.

COTTON SEED.—£7 12s. 6d. to £9 per ton. Cotton-seed oil, refined, £24 10s. to £25; crude, £23 per ton.

OIL CAKE.—Cotton seed, £4 17s. 6d. to £5 per ton; decorticated, £7 to £8 per ton.

EGGS.—French, 10s. to 10s. 6d. per 120; Italian, 7s. to 7s. 9d.; Russian, 5s. 3d. to 6s. 9d.

HONEY.—Finest Irish, 40s. per cwt.; Jamaica, 27s. per cwt.; Australian, nominal, 24s. to 26s. per cwt.

LINSEED OIL.—£33 15s. to £34 per ton.

OLIVE OIL.—£33 to £36 10s. per tun; eating oil, £50. Lucca, 3s. 9d. to 5s. per gallon.

HEMP (NEW ZEALAND).—£22 10s. per ton; sisal, £21 to £23 per ton.

RUBBER.—Soft, fine, 3s. 11d. per lb; Para, fine, 4s. 2½d.; coarse, 2s. 3d. to 2s. 7d. New Guinea, good ball, 3s. 4d. per lb. Ceylon (Para seed), 3s. 11d. per lb. Prices are likely to go higher.

WOOL.—The wool market continues very unsatisfactory both at home and abroad, and prices are painfully depressed. There appears, however, to be the shadow of a hope that better prices may prevail at an early date. It is reported that recently sales for good combing, greasy wools, and greasy merinos and crossbred wool of fine, light, and free description, have ruled rather higher. In Melbourne the market for merinos was firm, but inferior qualities receded about 5 per cent. below opening prices for the season.

The fifth and last series of London wool sales this year closed on 3rd November, the market being firm. Good merinos sold at from $\frac{1}{2}$d. to 1d. above the opening rates of the series, and faulty merinos at about 15 per cent. below the closing rates of the July series. Low crossbreds were firm at the opening rates of the series, while firmer crossbreds showed a slight improvement on the opening rates, but were from $7\frac{1}{2}$ to 10 per cent. below the July closing prices.

Of the quantity offered, 71,000 bales went to the Continent, 162,000 were taken by home buyers, 5,000 were sold to American buyers, and 133,000 were held over.

The following are the average prices obtained for the fleece portions of the clips named:—Engelfield, 9d.; Windabyne, 8d.; Bredbo, $7\frac{3}{4}$d.; Tongs, $6\frac{5}{8}$d.; Maneroo, $15\frac{3}{8}$d.; Leslie Hill, $8\frac{3}{4}$d.; New South Wales, scoured, 1s. 3d. to 1s. 4d.; New Zealand, scoured, 1s. $4\frac{1}{2}$d. to 1s. $5\frac{1}{2}$d.; Victorian, scoured, 1s. 6d. to 1s. 7d; Victorian, crossbred, 10d. to 1s.

Frozen Meat.—The following are the latest quotations (10th November) for the various descriptions of frozen meat mentioned:—

New Zealand Mutton (crossbred wethers and merino ewes).—Canterbury, $4\frac{1}{4}$d.; Dunedin and Southland, 4d.; North Island, $3\frac{7}{8}$d.

Australian Mutton (crossbred and merino wethers).—Heavy, over 50 lb., none offering; light, under 50 lb., $3\frac{9}{16}$d.

River Plate Mutton (crossbred and merino wethers).—Heavy, $3\frac{5}{8}$d.; light, $3\frac{3}{4}$d.

New Zealand Lambs.—Prime Canterbury (32 lb. to 42 lb.), $4\frac{3}{4}$d.; fair average, $4\frac{1}{2}$d.

New Zealand Frozen Beef (fair average quality).—Ox, fores (100 lb. to 200 lb.), $3\frac{5}{16}$d.; ox, hinds (180 lb. to 200 lb.), 4d.

Australian Frozen Beef (fair average quality).—Ox, fores (160 lb. to 200 lb.), $3\frac{1}{8}$d.; ox, hinds (160 lb. to 200 lb.), $3\frac{5}{8}$d.

The above prices are the official quotations furnished by the Frozen Meat Trade Association. The basis of quotations is sales of lines of not less than 100 carcasses of mutton or lamb, or 25 quarters of beef. All the quotations for mutton are for average quality. Quotations for New Zealand and Australian lambs do not include sales of small lambs or heavies or inferior quality.

Bacon.—Irish, 60s. to 64s. per cwt.; Canadian, 56s. to 60s.; United States 44s. to 48s.

Hams.—Irish, 84s. to 102s. per cwt.; American, 48s. to 59s.

Hides.—Active demand. Brisbane heavy hides are quoted at $5\frac{5}{8}$d. per lb., and light $5\frac{3}{8}$d.; New Zealand basils, $11\frac{1}{4}$d. per lb.

Tallow.—At the auction sales of Australian tallow in London on 7th November, the quantity offered was 1,425 casks, and the quantity sold 1,125 casks. The price realised for mutton tallow, fine, was 28s. per cwt.; medium, 26s. 9d.; beef, fine, 27s. 9d; medium, 26s.

TRADE OF JAPAN IN 1899.

The importation of raw cotton continues to increase rapidly. This material occupies by far the most important position on the list of imports of Japan. The reason for the growth in the demand for raw cotton is the steady development of the cotton-spinning industry. Between two and three times as much cotton was imported in 1899 as against importations in 1898. Thus in the latter year, the value of imported cotton was £4,669,738, whilst in 1899 the value rose to £6,350,677. The countries whence cotton is exported to Japan are: British India, China, France, India, Siam, America. There should certainly be here a good opening for a cotton trade between Queensland and Japan.

Oil cake is also annually imported to the value of £693,331. The imports of sugar, brown and white, reach a total of 162,608 tons valued at £1,788,095. Coal imports are represented by 51,243 tons, worth £95,661. The trade in wool is also considerable. In 1899 Japan imported raw wool to a value of £441,452, besides £204,595 worth of woollen cloth. Rice figures largely amongst the imports of the country, 98,249 tons, value £608,434, having been imported last year. Flax, hemp, jute and ramie, including probably sisal hemp, and New Zealand flax are represented by £127,099. Butter also is largely imported. Now, all these articles above enumerated can be, and are being, produced in Queensland, yet this colony only figures in the trade returns for 1899 to the amount of £395,939, principally on account of preserved meat, butter, wine and flour, whilst the import and export trade with other countries far more distant is shown in the following table:—

British Empire—	Imports.	Exports.	Total.
Great Britain	£4,577,812	£1,150,557	£5,728,369
Hongkong	749,134	3,500,571	4,249,705
British India	4,479,813	618,834	5,098,647
Australia	174,426	221,513	395,939
Canada	18,581	240,722	259,303
	£9,999,766	£5,732,197	£15,831,963
United States	£3,901,205	£6,525,092	£10,426,297
France	588,835	3,087,800	3,676,635
Germany	1,798,013	387,603	2,185,616
China	2,928,539	4,109,573	7,038,112

The trade of Japan is rapidly increasing, the cost of living there is becoming greater owing to the ever-growing spending power of the middle and lower classes of the Japanese. Merchants have made much money since the opening of the country to foreign trade, and more particularly since the war. Farmers, too, are becoming more prosperous, and feel able to indulge more largely in articles that are not necessaries, and the demand for luxuries among all ranks of the people becomes more apparent year by year. Everything points to a large and increasing trade, in which Queensland should make a strenuous effort to have a much larger share than she has at present. Our figures are taken from the report on the foreign trade of Japan, for the year 1899, by Mr. A. H. Lay, assistant in Her Majesty's Consular Service, in Japan. They are derived from the returns issued by the Imperial Japanese Department of Finance.

WE are indebted to the courtesy of Messrs. Diddams and Co. for the portrait of the Hon. Robt. Philp, M.L.A., appearing as the frontispiece in this issue.

General Notes.

CORNCOB CHARCOAL.

It would seem as if the time is fast approaching when the by-products of the maize crop will be more valuable than the grain itself. The stalks, which are usually burnt as useless waste by the farmer, are converted, by chemical processes, into substances of great value. Especially are vast quantities of ground pith employed in the building of battleships. Between the outer and inner skin of the ship the pith, ground and subjected to enormous pressure, is packed in, and this practically renders the ship watertight, even when the iron plating is pierced by shells. When one of these passes through a vessel's side a little water follows, and this, being soaked up instantly by the pith lining, so swells the latter that the hole is hermetically sealed. Artificial rubber is now made from the refuse of the glucose factories. The oily substance in corn does not readily oxidise, and this is a great advantage for the new product. It is the starchy and glutinous portions of the kernel of corn which are used for the manufacture of glucose and starch. There are many other chemical substances made from the pith of the stalk, which are of practical commercial value. Charcoal is very simply made from the cobs. A pig-breeder in the States gives the following directions for making it:—

Dig a hole in the ground 5 feet deep, 1 foot in diameter at the bottom and 5 feet at the top, for the charcoal pit. Take the corncobs, which have been saved in a dry place, and starting a fire in the botton of the pit keep adding cobs so that the flame is gradually drawn to the top of the pit, which will be thus filled with the cobs. Then take a sheet-iron cover, similar to a pot lid in form, and over 5 feet in diameter, so as to amply cover the hole and close up the burning mass, sealing the edges of this lid in turn with earth. At the end of twelve hours you may uncover and take out a fine sample of corncob charcoal.

There are about 110,000 acres now annually planted with maize in Queensland. If farmers were able to utilise the cornstalks or to sell them to some factory, and by so doing add another £1 an acre to their return, here would be a clear gain of £100,000 per annum. Unfortunately, the colonies have not yet reached the stage of building battleships, and it is highly improbable that cornstalks will even pay to ship; and, unless some enterprising firm were to start a factory for the preparation of the pith, we fear that this particular by-product will not prove of any benefit to the Queensland farmer.

THE CULTIVATION OF OSIERS.

The osier, which is a species of willow, is grown in most of the large swampy areas of France and Germany. In these countries we have seen many hundreds of acres of land absolutely valueless from an agricultural point of view, planted with osiers, and giving employment to many thousands of persons connected with basket-making trade. Those who have visited the Darling Downs have seen how easily the ordinary willow grows on the banks of the Condamine and of many creeks and lagoons. Osiers should do equally well, and would, if planted in quantity, soon become a good source of revenue. The first planting, which is very simply done, is the only expense connected with the work until, of course, cutting time (in about the second year).

The plants should consist of cuttings about 18 inches long, and should be planted for convenience in rows 2 feet apart, but we have seen whole marshy tracts entirely covered with osiers without any interval, so that the cutters had to make their own track through the miniature jungle. Basket-making is now an established industry in Queensland, and must naturally expand with the increase of population. Osiers would then become a valuable marketable commodity.

PICKLING CUCUMBERS.

On this subject Mr. E. J. Bennett writes:—Observing in the October, 1900, issue of the *Agricultural Journal*, an article on pickling cucumbers, I am reminded of a system adopted largely in Russia.

In Russia they have a small cucumber about the size of a goose's-egg, which is pickled very largely. So far as I can remember, the cucumbers (whole) are placed in a keg or jar, in a moderately strong brine between layers of black-currant leaves with a little fennel between each layer, care being taken to keep the cucumbers completely covered by the brine. They are thus left, and kept for use during winter, and form, I believe, a very important article of food, especially among the lower classes.

I tried the plan myself some years ago with fair success, but not being able to procure black-currant leaves I substituted oak leaves, which are sometimes used in Russia. I have, however, lost the seed which I originally received from relatives in St. Petersburg. The cucumber is far more delicate for eating than the usual green sort, but there is a small white kind nearly as good and about three times the size of the Russian, and which would, I think, answer equally well.

They are not soaked in water to remove the salt when required for use, nor are they soaked in vinegar. They are not, however, appreciated generally at first.

A NEW FRUIT.

A correspondent of the *Weekly Times* writes:—At a late meeting of the the Royal Horticultural Society a fruit was exhibited for the first time which bids fair to become very useful. From a botanical point of view also it is of considerable interest, the plant bearing it being a hybrid between the raspberry and the common blackberry. As the "Mahdi," as it has been called, was raised by Messrs. Veitch, its origin is well authenticated, the seed parent being a variety of the raspberry known as "Belle de Fontenay." The same cannot be said for the Logan berry hailing from the other side of the Atlantic, for which a somewhat similar parentage has been claimed. A high authority, however, is of opinion that the raspberry plays no part in its composition, and that both its parents were an American species of *Rubus* instead of only one. The "Mahdi" has very much the habit of the blackberry, and in cultivation it is trained in the same way. Its fruit recalls to some extent the dewberry of our hedges. There is the same bloom, but the number of fruitlets is greater. Careful scrutiny will reveal many intermediate characters; the taste of the "berry" combines a preponderant flavour of the dewberry with a suspicion of that of the raspberry. Most important is the time of fruiting as regards the future of the plant economically, for it comes into bearing as the raspberries are failing and before the blackberries are ripe. The "Mahdi" is very prolific, and has considerable claims to be a decorative plant; it will not, however, be placed upon the market for probably another twelve months at least.

TO PRESERVE MUSHROOMS.

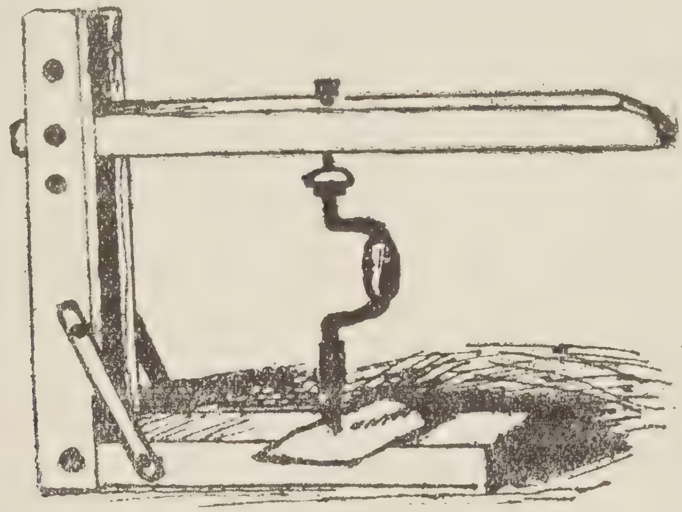
If you have a large quantity gathered at one time, as often happens in the country, and find there are more than can be used at once, they may be preserved in jars in the following manner and will keep good for a month:—

Peel any quantity of mushrooms, wash, drain, and dry them. Put 2 oz. of butter to every pint of mushrooms in an enamel stewpan; when it boils put in the mushrooms, stir in some salt, a pinch of cayenne, and a pinch of pounded mace; stir them until they are well mixed, then cover the stewpan with a closely fitting lid, and let them simmer gently at the side of the stove until they are quite tender. Put them into clean dry jars and cover with clarified butter. When required for use, they may be just made hot and served on buttered toast; with bacon or steak they are delicious. Or they may be used to flavour soups and made dishes.

MECHANICAL POWER APPLIED TO A HAND BRACE.

No doubt, most of our readers have experienced the extremely hard labour of drilling iron with only an ordinary brace to do it with, and the following idea has been carried out with much success by one of our subscribers who has drilled hundreds of holes up to $\frac{3}{4}$-inch in iron and steel up to $2\frac{1}{2}$ inches in thickness. Everyone knows the latter would, by the breast drill process, take hours to bore if it was attempted.

The drawing will explain itself. The drill frame can be made of fence posts and rails bolted together, or even mallee poles, cut to shape with an adze, but a



Lever Stand for Hand Brace.

piece of sleeper for the bed is just the right thing. We would much prefer bolting it together, as then all the parts will be interchangeable, and also much stronger. The top rail is adjustable to three different heights to suit different length drills, and is made wide enough to sit on comfortably, and about 30 inches long. For leverage, the other parts are in proportion to the size of the brace used. Either hand is used to turn the brace. It can have a steel centre to run on at the top if desired, but this is not absolutely necessary. The advantages are an enormous increase in power, and a comfortable sitting position while at work.—*Garden and Field.*

SPARROWS.

Those who maintain that sparrows do not eat insects might have altered their opinion had they lately been walking on the North Quay in the early morning. Sparrows are very numerous in this locality, and every day they have been very busy, breaking up and carrying off piecemeal the large golden-green beetles which drop from the trees overhanging the sidewalk. They have also been hard at work, generally in the afternoon, hopping along the upper runner of grape vines or other creepers trained to shade our verandas, carefully searching the eaves for spiders, which they carry off in large numbers. Another instance of the value of sparrows as insectivorous birds: A thousand-headed kale plant, growing against our garden fence, in due course flowered and produced seed pods. To preserve the seed from the expected attacks of the sparrows, a mosquito-net was thrown over the whole plant, but one or two seed-heads were not enclosed. By-and-by the plant was covered with plant-lice, and the only heads which were free from them were those to which the sparrows had access. They completely cleared off the insects, and did not touch a single seed pod. Day after day we watched the birds at their work, and they became so tame that they did not desist even if the gardener was working close to them, so that the work they were doing could be positively ascertained. Furthermore, every particle of seed was saved.

A NOVEL TELEPHONE.

The British Consul at Philadelphia describes in his last report a cheap telephone system for the use of farmers which is employed between the towns of Anderson, Pendleton, and Ingalls, in Indiana. It is not an experiment, but is in active daily operation, and gives a service which is reported as comparing favourably with the lines of the regular companies. The line is unique in that it employs as a conductor such a common everyday commodity as the top wire of a barb-wire fence, the continuity of the line being assured by special devices at highways and railway crossings. The line is 14 miles in length, with five stations—two at Anderson, two at Pendleton, and one at Ingalls. The success of this novel telephone line is stated to be due largely to perfect insulation. The builder has used the top stand of the fence-wire, which is treated to a generous coating of rubber paint. At the breaks in the fence, common galvanised wire is used to continue the circuit to a connection with the next fence, the same arrangement being carried out at the railway crossings. In order to carry the line across the road or highway the circuit is either placed beneath an inverted trough, covered by the material of the road, or it is carried overhead by means of two poles, one on each side of the crossing. The cost of this telephone outfit is extremely low, as there is no expense for copper wires, and poles are only needed at the crossings. Where the number of customers is not too large, the service is said to be all that could be desired. Local farmers state that they have used the "fence line" to converse with friends 8 miles distant, and this at a time when the fence posts were still saturated with the morning dew—a condition under which the line is supposed to work with the least satisfaction. It is stated that the line has been such a practical success that the farmers of the neighbourhood are organising companies for the purpose of placing themselves in telephonic communication throughout the whole district. A further evidence of the practicability of the barb-wire telephone is found in the case of the Wagner Glass Company, with offices at Anderson, who are able to communicate daily with their works at Ingalls, 13 miles distant.—*Weekly Times.*

A NEW SPRAYING MACHINE.

A new spraying machine for dealing with the cryptogamic diseases of the vine, such as oidium peronospera, is at this moment under the observation of Agricultural Society of Algeria. The trials made by the inventor caused him to reduce the dose of sulphate of copper to 500 grammes per vectolitre of water. The inventor also claims that this bouillie resists the heaviest and most continuous rains.—*Engineer.*

A REMEDY FOR ANTS.

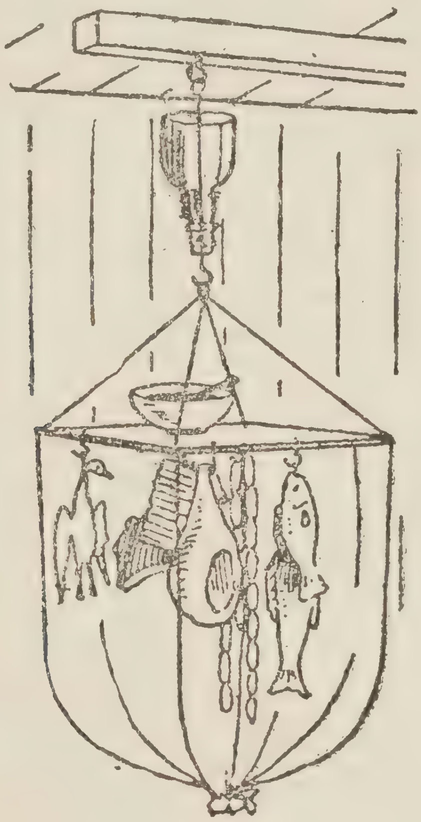
The *Ceylon Tropical Agriculturist* says that one of the latest remedies for ants is gasoline. Pour about half a pint into the ant hill and set it on fire. The gasoline will instantly spread throughout the ant hill, and as the heat on the surface increases the gas will generate from the utmost recesses and the fire destroy the ants. Half a pint will burn from three to eight hours, and kill every ant in the largest nest, and all that attempt to enter it from without.

WORM RECIPES FOR PIGS.

Here are five recipes for worms in pigs:—1. Santonin, quarter teaspoonful at a dose. Dissolve in hot water or alcohol and mix with a little gruel or milk. 2. Fluid extract of spigella and senna, equal parts, given in ½-oz. doses every 4 hours until it causes purging. 3. Turpentine in milk, or a small portion of good slop, from 15 to 20 drops 3 times a day. 4. Coal oil in slops has been found effective. 5. Tobacco boiled down to a small decoction in water, given in teaspoonful doses three days in succession, in some slop, mornings. One, two, and three should be followed by a physic of salts or oil. All these doses are for full-grown pigs. Give pigs less in proportion to size.—*Jamaica Journal.*

SAFE FOR THE BUSH.

In the bush and in the shepherds' huts a properly-constructed meat-safe is seldom likely to be an item of the household furniture. The diagram probably needs little explanation. A piece of pine board, about 1 inch in thickness, cut either round, square, or triangular, to fit a corner, is suspended by string or light wire to a hook made of iron or stout fencing wire, which passes through the cork of a bottomless bottle, partially filled with water, which may be rendered still more obnoxious to marauding ants by the addition of a little kerosene. A bag of mosquito net, or other material, open at each end, corresponding in circumference to the board, which is fitted with screw hooks to



support provisions, is closely tacked along its edge; the entrance is from below through the open mouth of the bag, which should be closed with a string or tape when not in use. If required, two or more shelves may be suspended beneath each other in a similar manner. The bottle, which should be a thin, white glass one, may be cut by tying a piece of soft twine, saturated in naphtha or kerosene oil, round the required place, igniting same, and, when burnt out, quickly plunging the bottle into cold water, when a clean fracture will generally result.—*Australasian.*

DUTCH BUTTER.

It is surprising that a nation should be so blind to its own interests as to permit of trade practices which are directly injurious to some particular industry. Take the case of Dutch butter, which usually fetches a high price in the London market. It is stated in an English journal that lately 5,500 tons of Siberian butter were sent to Holland, re-packed, and shipped to England as Dutch butter. Should this statement be correct, then Australians may take heart of grace, for assuredly their butter will have little difficulty in running the spurious Dutch article out of the market.

PROTECTING POWDER-MAGAZINES FROM LIGHTNING.

The French Minister of War has invited the Paris Academy of Sciences to advise as to the precautions to be adopted in selecting and planting trees in the neighbourhood of powder-magazines, in order to secure the best protection from lightning.

PRESERVED GINGER (MARROW).

This is really a capital imitation of the genuine article, and is much appreciated, especially in winter.

Peel, seed, and then weigh a vegetable-marrow, cut it into little lumps about 1 inch wide, and 2 inches long; put them into an earthenware dish.

Into a stew-pan put one quart of water and 1 lb. of moist sugar, when it boils pour it over the pieces of marrow, cover them, and let them stand for two days. Then drain the marrow from the syrup, and put it into a stew-pan with quarter-pint of fresh water, 1 lb. of loaf sugar, ½ oz. of ground ginger, as much cayenne as will stand on a threepenny piece, and the strained juice of a lemon to every pound of marrow, weighed after it was peeled and seeded. The cayenne and ginger must be tied in a little bag of coarse muslin. Let it simmer very gently until the marrow is transparent, then add some gin if liked, about half a wineglassful to every 4 lb. of marrow. Pour into jars, cover closely so as to exclude the air, and store in a cool, dry place.

USEFUL FRUIT-GATHERING DEVICE.

The two accompanying illustrations show a handy device for picking fruit the advantage over a basket being the clear open space that is afforded in this

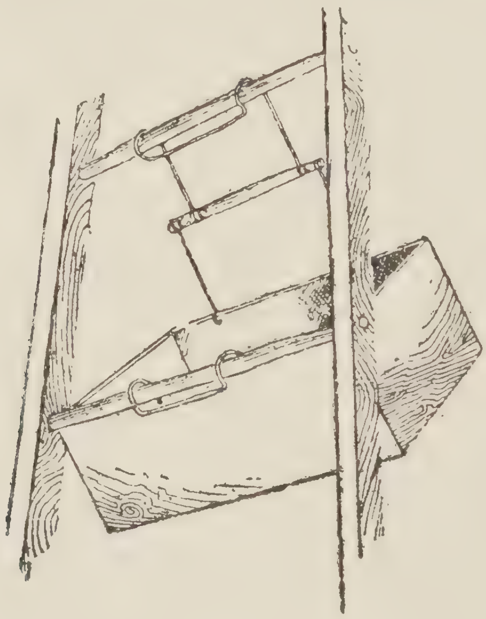


FIGURE 1.

case, where the handle of the basket must constantly be avoided by the picker's hand. Fig. 1 shows the box in position on the ladder, while Fig. 2 shows it with the handle in place for carrying away the fruit when the box is

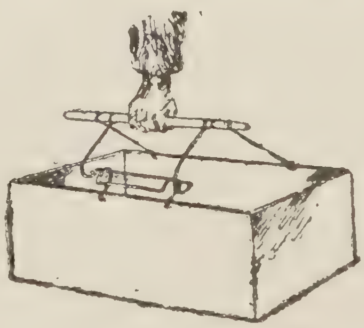


FIGURE 2.

full. It is so simple that one can make the whole thing in a few moments, if an empty box of the right size is at hand, and a few pieces of No. 12 wire.—*American Agriculturist.*

RAIN-MAKING.

Mackay, the oldest sugar-producing district of the North, which is always to the front in adopting new ideas which may prove of value to sugar planters and manufacturers, has now taken the initiative in establishing what are known as "gunning stations" for preventing the destructive effects of hailstorms. This *Journal* has printed several articles on the subject, notably one by Mr. H. Tardent on "Hail and Hailstorms" (Vol. VI., page 251, April, 1900). It will be observed that we have not advocated the firing of guns or mortars *for the production of rain*, but for the purpose of *subduing hailstorms.* When a heavy storm is coming up, there is usually a greenish appearance which threatens hail. When a hailstorm is expected, the guns are fired at all the stations within its influence, and the dreaded hail then falls in harmless rain. The act of firing guns during a drought will have no effect in inducing a fall of rain. Still, when heavy rain-clouds are hanging about, the concussion of the discharge producing strong air waves may have the effect of producing rain; but what our articles on the subject were intended to show was that the destructive effects of hailstorms may be minimised, if not entirely averted, by firing guns continuously on the appearance of suspicious clouds.

POULTRY-HOUSE WHITEWASH.

A capital whitewash is made by mixing common water-lime cement with sweet skimmed milk to the proper consistency. The following is a good recipe:—Put two pailfuls of boiling water in a barrel; add ½ bushel of well-burned, fresh quicklime; put in quickly 1 peck of common salt, dissolved in hot water, and cover the barrel tightly to keep in the steam while the lime is slaking; when the violent ebullition is over, stir till well mixed together, and, if necessary, add more boiling water, so as to have the mass like thick cream; strain through a sieve of coarse cloth. Make a thin starch of 3 lb. of rice flour and 1 lb. of strong glue, having first soaked the glue in cold water, and to the latter mixture add 2 lb. of whiting. Add this to the limewash, and also sufficient hot water to dilute to the proper consistency; keep hot while applying. It will require about 6 quarts of the mixture to 100 square feet of surface, and it will last remarkably well. It goes without saying that it may be made any colour desired.

YIELDS OF CORN.

Last year the *American Agriculturist* offered a prize of £100 for the best acre of maize grown; 45 acres were entered, the winning acre producing 255 bushels and the lowest 51 bushels, the average being 104 bushels.

Agricultural Patents.

APPLICATION ACCEPTED.

Patent Office, Brisbane, 7th November, 1900.

The undermentioned application for a Patent has been accepted at the Queensland Patent Office:—

Raising Sub-Artesian Water.—Application No. 5255: James Claude Leslie Rowe and Richard Rowe, Uanda Station, near Aramac, in the colony of Queensland, contractors, and Mary Frances Snell (wife of John Cobham Snell), of Uanda Station aforesaid, in the said colony. "Improved Means for Forcing or Lifting Water from Artesian Bores which do not Flow to the Surface." Dated 2nd November, 1899. (Drawings, 5s.; specification, 3s.) A piston at the end of a small tube is forced down the casing until the water is impelled to the surface through the small tube.

The Markets.

AVERAGE TOP PRICES FOR OCTOBER.

Article.		OCTOBER. Top Prices. £	s.	d.
Bacon	lb.	0	0	7
Bran	ton	5	6	10½
Butter, First	lb.	0	0	9⅜
Butter, Second	„	0	0	6½
Chaff, Mixed	ton	3	6	10½
Chaff, Oaten	„	4	8	9
Chaff, Lucerne	„	3	18	9
Chaff, Wheaten	„	2	11	3
Cheese	lb.	0	0	7
Flour	ton	8	10	0
Hay, Oaten	„	3	12	6
Hay, Lucerne	„	2	13	1½
Honey	lb.	0	0	1 1/16
Rice, Japan (Bond)	ton	15	7	6
Maize	bush.	0	3	9½
Oats	„	0	3	4¼
Pollard	ton	4	16	10½
Potatoes	„	5	11	3
Potatoes, Sweet	„	1	17	6
Pumpkins	„	1	16	3
Sugar, White	„	16	10	0
Sugar, Yellow	„	13	0	0
Sugar, Ration	„	10	10	0
Wheat	bush.	0	3	5¼
Onions	cwt.	0	11	6
Hams	lb.	0	0	9⅞
Eggs	doz.	0	0	7⅛
Fowls	pair	0	4	3
Geese	„	0	6	4½
Ducks, English	„	0	4	5¼
Ducks, Muscovy	„	0	5	7½
Turkeys, Hens	„	0	7	6
Turkeys, Gobblers	„	0	14	7½

ENOGGERA SALES.

Article.	OCTOBER. Top Prices. £	s.	d.
Bullocks	9	1	6
Cows	8	8	1½
Wethers, Merino	0	15	9
Ewes, Merino	0	11	0
Wethers, C.B.	0	15	7½
Ewes, C.B.	0	14	10
Lambs	0	12	3
Baconers	1	8	0
Porkers	1	7	7½
Slips	0	7	5

Orchard Notes for December.

By ALBERT H. BENSON.

In the Orchard Notes for November, I called special attention to the importance of marketing fruit properly, emphasising the necessity for careful handling, even grading, and attractive packing if satisfactory prices are to be obtained. Those remarks apply equally to the present month, or, in fact, to any month of the year, as there is always more or less fruit of one variety or another to be marketed; and it is simply wasting time and money cultivating, pruning, manuring, or spraying an orchard—in fact, doing everything possible to produce good fruit—if when the fruit is grown it is not put on the market in such a manner that it will realise the highest price. Careful handling, grading, packing, and marketing will secure a ready sale for good fruit in any market, even when the same fruit badly handled and unattractively got up would be unsaleable. Growers would do well to take a lesson in packing from the Californians who have been shipping apples, or from the Italians who are shipping lemons, to this colony, as those fruits, even after a long and trying voyage and one or more transhipments, reach here in better condition and in a much more attractive state than our local fruit, which is often only carted a few miles.

Keep down pests wherever met with; gather and destroy all fly-infested fruit. Destroy orange bugs before they become mature by hand-picking or by driving them to the trunks of the trees, by tapping the other branches with light poles, the insects being brushed off from the trunks and main branches on to a sheet placed under the tree to catch them, from which they can be easily gathered and burnt.

All caterpillars, cut-worms, beetles, grasshoppers, crickets, or other insects destroying the foliage should be destroyed by either spraying the same with Paris green, 1 oz. to 10 gallons of water, or by dusting them with a mixture of Paris green and air-slacked lime, 1 oz. of Paris green to 5 lb. of lime. Keep the orchard well cultivated, especially in the dry districts; and where there is water available for irrigation, in such districts all citrus trees should receive a watering during the month unless there is a good fall of rain, when it will be of course unnecessary.

Pineapples, bananas, and other tropical fruit can be planted during the month, showery weather and dull days being chosen. The rainy season is the best time to transplant most tropical plants. Where it is desirable to go in for green-crop manuring, or for raising a green crop for mulching, cow peas can be sown, as they will be found to make a very rapid growth now, which will be strong enough to keep most weeds in check.

See that all surface and cut-off drains are in good working order, and not choked up with grass, weeds, &c., as heavy rain may fall during the month, and there should be a get-away for all surplus water, which would tend to either wash the soil or sour it; stagnant water round the roots of the trees being exceedingly injurious at any time, and especially so during the heat of summer.

Farm and Garden Notes for January.

Farm.—During the hot weather which will now be experienced, the principal business of the farmer will be to prepare land for future crops. Weeds will be much in evidence, and every care must be taken to destroy them before they seed. A little maize may still be sown for a late crop. In some localities, early potatoes may be sown, but they must be planted whole and have plenty of room. In any case, such early planting can only be done by way of experiment which may be successful or the reverse. Sow sorghum, imphee, Cape barley, vetches, panicum, teosinte, rye, and cow peas. It is highly probable that heavy rains will occur in the early part of the year, but seasonable showers must not be implicitly relied upon.

Kitchen Garden.—Although the great heat of the weather during the present month must militate against general success in sowing seeds, yet sowings of cabbages, cauliflower, and Brussells sprouts may be made in covered seed beds, copiously watered and carefully watched for insects. Such sowings should be made in drills in narrow beds, in which case they are far more likely to succeed than if sown broadcast. Remember that shading and watering are the main points to be attended to. Heavy watering is necessary, a mere sprinkling being actually injurious. Mulching will be found very beneficial, as will also a slight dressing of salt. All unoccupied land should be dug, and green refuse, such as cabbage leaves, turnip tops, &c., turned under, as they form a valuable manure. Heavy land should be turned over and the lumps broken roughly, as the exposure to the sun and wind will greatly improve the texture of such soils. Sow celery in shallow, well-drained boxes, and be careful to shade till the plants are well up. Parsley should be sown in the same way. When the weather is favourable, sow French beans, cress, mustard, celery, and radish for autumn and winter use. Parsley, carrot, peas, and endioc may be sown, and it is still not too late to try cucumbers and melons for a late crop. Onions should now be ripe, as also garlic and eschallots, which should all be gathered as their tops die down. In planting out cabbage, &c., be careful to protect the plant from the sun for a few days until the new roots are formed. It is not advisable to sow the main crop of any of the above vegetables during the month, but small sowings carefully managed will keep up a fair supply until the cool weather begins.

Flower Garden.—Sowings should be made under cover or in sheltered prepared seed beds for early plants of cineraria, primula, gloxinia, calceolaria, and pansy; for late blooming—Sweet William, calendula, balsam, gaillardia, zinnia, coreopsis, dianthus, &c. Tie up and stake all tall-growing plants, such as dahlias and chrysanthemums. Both of these will derive great benefit from a watering of liquid manure once or twice a week. Cut off all spent flowers of any kind. This lengthens the flowering season, because one cannot expect a plant to expend its strength in producing seed, and yet give a good crop of flowers.

Coleus beds will now be at their best, and every opportunity should be taken of favourable weather to put in cuttings with which to fill up blanks. Roses may now be budded. It is needless to repeat the old story—keep down the weeds.

Public Announcements.

THE Editor will be glad to receive any papers of special merit which may be read at meetings of Agricultural and Pastoral Associations in Queensland, reserving, however, the right to decide whether their value and importance will justify their publication.

THE *Queensland Agricultural Journal* will be supplied to all members of Agricultural and Horticultural Societies who do not derive their livelihood solely from the land, on payment, in advance, of an annual subscription of 5s.

ADVERTISEMENTS.

Advertisements which relate wholly to the sale of Agricultural Machinery, Seeds, Plants, Manures, Farm Stock, Feeding Stuff, &c., will be inserted in the *Journal* at the following rates:—

	£	s.	d.
Full page, per issue	4	0	0
Half page, per issue	2	10	0
Quarter page, per issue	1	10	0

On advertisements standing for six months a discount of 15 per cent. will be allowed, and 25 per cent. on those inserted for twelve months.

SISAL HEMP PLANTS.

The Department of Agriculture having a quantity of sisal hemp plants and seedlings for gratuitous distribution, intending planters are requested to make early application for the same to the Under Secretary for Agriculture.

LIST OF AGRICULTURAL, HORTICULTURAL, AND PASTORAL SOCIETIES AND ASSOCIATIONS IN QUEENSLAND.

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Allora ...	Central Downs Agricultural and Horticultural Association	J. H. Buxton... ...	7 Feb.
Avondale ...	Avondale Farmers' and Planters' Association	N. J. Mikkelsen ...	
Ayr	Lower Burdekin Farmers' Association ...	Winsor H. Wilmington	
Beaudesert ...	Logan and Albert Pastoral and Agricultural Society	M. Hinchcliffe ...	11 May
Beenleigh ...	Agricultural and Pastoral Society of Southern Queensland	Wilson Holliday ...	7 Sept.
Biggenden ...	Biggenden Agricultural and Pastoral Society	Charles H. Peppin ...	14 June
Biggenden ...	Biggenden Farmers' Association	Charles H. Peppin ...	
Birthamba ...	South Kolan Agricultural and General Progress Association	G. W. Nixon ...	
Blackall ...	Barcoo Pastoral Society	F. Clewett	
Boonah ...	Fassifern and Dugandan Agricultural and Pastoral Association	J. A. McBean ...	14 and 15 June
Bowen ...	Pastoral, Agricultural, and Mining Association	J. E. Smith	9 Aug.
Bowen ...	Preston Farmers' Association, Lower Proserpine	G. Archer	
Bowen ...	Preston and Mount Marlow Farmers' Association, Lower Proserpine	D. W. Lanzky ...	
Booyal ...	Booyal Farmers' Progress Association ...	Thos. Skillington ...	
Brisbane ...	Horticultural Society of Queensland	J. F. Bailey	26 and 27 April
Brisbane ...	Moreton Agricultural, Horticultural, and Industrial Association	J. Duffield	
Brisbane ...	Queensland Acclimatisation Society	E. Grimley	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Brisbane ...	National Agricultural and Industrial Association of Queensland	H. C. Wood	7, 8, 9, and 10 Aug.
Brisbane ...	Queensland Stockbreeders' and Graziers' Association	F. A. Blackman ..	
Brisbane ...	United Pastoralists' Association	Fredk. Ranson ...	
Bundaberg ...	Bundaberg Horticultural and Industrial Society	H. E. Ashley ...	
Bundaberg ...	Council of Agriculture	Jos. Campbell ...	
Bundaberg ...	Woongarra Canegrowers' and Farmers' Association	W. H. Dart	
Burpengary...	Burpengary Farmers' Association	C. H. Ham	
Byrnestown...	Byrnestown Farmers' Progress Association ...	J. Dufficy	
Caboolture ...	Caboolture Farmers' Association	G. Mallet	
Cairns ...	Aloombah Farmers' Association	Chas. R. Spencer ...	
Cairns ...	Cairns Agricultural, Pastoral, and Mining Association	A. J. Draper	28 and 29 Sept.
Cairns ...	Cairns District Coffee Growers' Association...	W. A. Hannam ...	
Cairns ...	Cairns District United Farmers' Association	Wm. Griffin ...	
Cairns ...	Hambledon Planters' Association	E. Whitehouse ...	
Charleville ..	Central Warrego Pastoral and Agricultural Association	E. F. C. Manning ...	25 and 26 May
Charters Towers	Towers Pastoral, Agricultural, and Mining Association	W. Tilley	30 and 31 May; 1 June
Childers ...	Isis Agricultural Association	H. Epps	
Childers ...	Doolbi Mill Branch, Isis Agricultural Association	W. T. H. Job ...	
Childers ...	Childers Mill Branch, Isis Agricultural Association	H. Epps	
Clermont ...	Peak Downs Pastoral, Horticultural, and Agricultural Society	F. Leysley	
Clermont ...	Peak Downs Dairymen and Settlers' Association	A. G. Pursell ...	
Cooktown ..	Cook District Pastoral and Agricultural Society	W. R. Humphreys ...	
Cooran ...	Cooran Progress and Agricultural Association	Thos. Smith	
Cordalba ...	Cordalba Farmers' Association	B. Goodliffe	
Currajong ...	Currajong Farmers' Progress Association ...	Wm. Howard ...	
Cunnamulla	South Warrego Pastoral Association	J. Winward	
Dalby ...	Northern Downs Pastoral and Agricultural Association	W. M. Alexander ...	July
Dallarnil Scrub, *viâ* Degilbo	Dallarnil Farmers' Association	W. E. Burton ...	
Deception Bay	Deception Bay Farmers' Association	B. J. T. Liscombe ...	
Degilbo ...	Degilbo District Farmers' Association ...	J. Harvey	3 and 4 Jan., 1901
Gayndah ...	Gayndah Agricultural and Horticultural Association	J. C. Kerr	
Gladstone ...	Gladstone Pastoral and Agricultural Association	W. J. Manning ...	
Gooburrum, Bundaberg	Gooburrum Farmers' and Canegrowers' Association	W. J. Tutin	
Goondiwindi	MacIntyre River Pastoral and Agricultural Society	A. Warden	
Gympie ...	Agricultural, Mining, and Pastoral Society	F. Vaughan	13 and 14 Sept.
Gympie ...	Chatsworth Farmers' Progress Association ...	William Bellman ...	
Gympie ...	Deep Creek Farmers' Progress Association ...	W. Reid	
Gympie ...	Gympie Horticultural Society	Charles Brasch ...	19 and 20 April
Gympie ...	The Pie and Eel Creek Farmers' Association	Wm. H. Ryan ...	
Gympie ...	Gympie Central Farmers' and Progress Association	J. Howard Maynard	
Haslemore, Victoria, Herbert Riv.	Herbert River Farmers' League	Alfred Henry ...	
Helidon ...	Helidon Scrub Farmers' Progress Association	Jas. Tysoe	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Herbert River	Halifax Planters' Club	H. G. Faithful ...	
Herbert River	Macnade Farmers' Association...	Edwin S. Waller ...	
Herbert River	Ripple Creek Farmers' Association	J. W. Grimes ...	
Herberton ...	Mining, Pastoral, and Agricultural Association	John M. Hollway ...	3 and 4 April
Hodgson ...	Hodgson Farmers' Association	C.W. Nimmo ...	
Hughenden ...	Hughenden Pastoral and Agricultural Association	H. P. Blackall ...	7 and 8 May
Ingham ...	Herbert River Farmers' Association	...	
Ingham ...	Herbert River Pastoral and Agricultural Association (Stock Show)	P. J. Cochrane ...	15 and 16 June
Ingham ...	Herbert River Pastoral and Agricultural Association (Agricultural Show)	P. J. Cochrane ...	Sept.
Ipswich ...	Ipswich and West Moreton Agricultural and Horticultural Society	P. W. Cameron ...	21 Sept.
Ipswich ...	Queensland Pastoral and Agricultural Society	Elias Harding ...	11 and 12 July
Kandanga (near Gympie)	Kandanga Farmers' Association	N. Rasmussen ...	
Kolan ...	Kolan Canegrowers' and Farmers' Association	C. Marks	
Ladeside ...	Mungore Farmers' Association...	J. M. Robinson ...	
Laidley ...	Lockyer Agricultural and Industrial Society	John Fielding ...	25 and 26 July
Loganholme...	Logan Farming and Industrial Association ...	F. W. Peek	
Longreach ...	Longreach Pastoral and Agricultural Society	J. P. Peterson ...	17 and 18 April
Lucinda Point	Victoria Farmers' Association	W. S. C. Warren ...	
Mackay ...	Agricultural, Pastoral, and Mining Association	F. Black	
Mackay ...	Pioneer River Farmers' Association	E. Swayne	28 and 29 June
Mapleton, *viâ* Nambour	Mapleton and Dulong Fruitgrowers' and Farmers' Progress Association	W. J. Smith	
Maryborough	Maryborough Horticultural Society	H. A. Jones	
Maryborough	The Island Farmers' Progress Association ...	C. A. Schmidt ...	
Maryborough	Wide Bay and Burnett Pastoral and Agricultural Society	G. Willey	4, 5, and 6 July
Miallo ...	Miallo Progress Association	E. F. Welchman ...	
Milbong ...	Milbong Farmers' Association	T. R. Garrick ...	
Mitchell ...	Mitchell and Maranoa Pastoral, Agricultural, and Vinegrowers' Association	H. J. Corbett ...	
Mosman River	Mosman River Farmers' Association	Geo. W. Muntz ...	
Mount Cotton	Mount Cotton and Tingalpa Division Fruitgrowers' and Farmers' Association	F. N. Sharman ...	
Mount Mee...	Mount Mee Farmers' Association	R. Thomas	
Mount Morgan	Mount Morgan Mining, Agricultural, Poultry, Pastoral, and Horticultural Society	G. Orford	
Mount Morgan	Mount Morgan Agricultural, Pastoral, and Poultry Society	Thos. W. Walker ...	
Mundoo ...	Johnstone River Farmers' Association ...	J. McInnes	
Nerang ...	South Queensland and Border Pastoral and Agricultural Society	W. J. Browne ...	8 Sept.
North Isis ...	North Isis Canegrowers' Association	W. J. Young ...	
Pialba ...	Pialba Farmers' Association	J. B. Stephens ...	
Pickenjennie	Wallumbilla Selectors' League	George Dalziel ...	
Pickenjennie	Pickenjennie Branch, Wallumbilla Selectors' League	George Dalziel ...	
Pinbarren ...	Pinbarren Agricultural and Progress Association	H. Armitage, senr. ...	
Port Douglas	Pastoral, Agricultural, and Mining Association	W. H. Dorrat ...	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Razorback ...	The Razorback Fruitgrowers' Association ...	Robert Tinning ...	
Rockhampton	Central Queensland Farmers' and Selectors' Association	T. Whitely, Coowonga	
Rockhampton	Central Queensland Pastoral Employers' Association	G. Mackay	
Rockhampton	Central Queensland Stockowners' Association	R. R. Dawbarn ...	
Rockhampton	Rockhampton Agricultural Society	R. R. Dawbarn ...	29 and 30 May
Roma ...	Western Pastoral and Agricultural Association of Queensland	Angus McPherson ...	
Roma ...	Yingerbay Farmers' Association	Alex. C. McIntyre ...	
Rosewood ...	Farmers' Club	P. H. Adams... ...	13 Sept.
Southport ...	Southport Horticultural Society	E. Fass	19 April
Springsure ...	Queensland Pastoral Society	G. R. Milliken ...	
Stanthorpe ...	Border Pastoral, Agricultural, and Mining Society	Geo. Simcocks ...	22 and 23 Feb.
Stanthorpe ...	Stanthorpe Horticultural and Viticultural Society	R. Hoggan	
Stanwell ...	The Stanwell Agricultural Society	A. Spanner	
St. George ...	Balonne Pastoral and Agricultural Association	T. M. Cummings ...	
Tinana ...	Tinana Fruitgrowers' and Farmers' Association	Chas. Parke	
Toowoomba...	Darling Downs Horticultural Association ...	H. Hopkins	
Toowoomba...	Drayton and Toowoomba Agricultural and Horticultural Society	H. Symes	
Toowoomba...	Royal Agricultural Society of Queensland ...	F. Burtt	31 July ; 1 and 2 Aug.
Townsville ...	Townsville Pastoral, Agricultural, and Industrial Association (formerly North Queensland Pastoral and Agricultural Association)	J. N. Parkes	6 and 7 June
Upper North Pine	Upper North Pine Farmers' Association ...	...	
Wallumbilla	Wallumbilla Selectors' League	George Dalziel ..	
Warwick ...	Eastern Downs Horticultural and Agricultural Association	J. Selke	31 Jan. & 1 Feb.
Wellington Point	Wellington Point Agricultural, Horticultural, and Industrial Association	F. W. Wort	13 June
Woombye ...	Woombye Fruitgrowers' Association	P. S. Hungerford ...	
Woowoonga	Woowoonga Scrub Farmers' Association ...	H. B. Griffiths ...	
Zillmere ...	Zillmere Horticultural Society	C. McF. Fischer ...	20 Jan.

"THE DISEASES IN PLANTS ACT OF 1896."

Department of Agriculture,
Brisbane, 19th January, 1899.

HIS Excellency the Governor, with the advice of the Executive Council, and in pursuance of the provisions of "*The Diseases in Plants Act of* 1896," has been pleased to make the following further Regulations.

J. V. CHATAWAY.

THE FUMIGATION OF FRUIT FOR EXPORT.

1. Any one who wishes to erect a chamber or building for the fumigating of fruit is requested to give notice to the Under Secretary for Agriculture, who will take steps to see that the chamber or building is properly constructed.

2. When it is required to fumigate fruit for export, twenty-four hours' notice must be given to the said Under Secretary or such other officer as may be duly authorised to accept such notice.

3. The operation of fumigating must be conducted under the control of an officer authorised by the Minister for Agriculture.

4. The fumigating chamber may be made of any convenient size or material, the essential point being that it shall be capable of being closed absolutely airtight, and provided with a flue-pipe in the roof which can be opened or closed to allow of the escape of the gas after fumigation. The flue must be provided with a box or chamber to contain caustic soda or potash to destroy the gas.

The fumigating chamber must be provided with a shutter or sliding panel in the lower portion of the door or wall.

Door, flue, and shutter must all be made to close absolutely airtight.

DIRECTIONS FOR FUMIGATING WITH HYDROCYANIC ACID GAS.

Proportions of Ingredients.—For every 150 cubic feet of room take 1 ounce of cyanide of potassium, 5 fluid ounces sulphuric acid, 10 fluid ounces water.

Having placed the fruit to be fumigated in the chamber, see that the flue and the shutter in the door or lower part of all are properly closed.

The acid is then to be diluted in the following manner:—The whole of the water is placed in a shallow china or glazed earthenware vessel, such as an ordinary wash-hand basin. (Metal vessels are inadvisable unless they are leaden ones.) The sulphuric acid is next poured on to the water in a thin stream, stirring the while with a stick. Do not mix by adding the water to the acid.

The basin containing the acid thus diluted (which should be allowed to cool) is now placed in the fumigating chamber, and the cyanide of potassium is emptied into it.

The gas is given off with great violence, and the door should be immediately closed.

The whole is now to be left to itself for one hour. At the end of this time the shutters in the flue and in the door are opened, and the draught produced drives the gas out of the chamber. At the end of half an hour the door is thrown open, and if the draught has been effective there should be hardly any trace of hydrocyanic gas recognisable. The chamber may be left in this condition for another ten minutes or a quarter of an hour. The fruit is now to be moved and allowed to remain in a well ventilated place, preferably out of doors, for another half an hour. Samples of fruit will be examined from time to time by the entomologist.

Caution.—As hydrocyanic acid gas is most deadly in its effects on animal life, the greatest care must be taken in its use.

Department of Agriculture,
Brisbane, , 18 .

This is to certify that has treated cases of citrus fruit with hydrocyanic acid gas for one hour, under my supervision. These cases have been branded "Crown" over "Passed."

Shipping marks:
Per S.S.:
Consigned to:

Department of Agriculture,
Brisbane, 26th January, 1899.

THE following Proclamation by His Excellency the Governor of New South Wales is published for general information.

J. V. CHATAWAY.

NEW SOUTH WALES, to wit. (L.S.) HAMPDEN, *Governor.*

PROCLAMATION.

By His Excellency The Right Honourable HENRY ROBERT, VISCOUNT HAMPDEN, Governor and Commander-in-Chief of the Colony of New South Wales and its Dependencies.

WHEREAS the Governor is empowered by Section 9 of the "Vegetation Diseases Act, 1897," from time to time, by Proclamation in the *Gazette*, to declare any fungus or vegetable parasite whatever to be a fungus within the meaning of the said Act: Now, therefore, I, HENRY ROBERT, VISCOUNT HAMPDEN, the Governor aforesaid, with the advice of the Executive Council, do, by this my Proclamation, declare Black Spot (*Fusicladium*) to be a fungus within the meaning of the said Act.

Given under my Hand and Seal, at Government House, Sydney, this twenty-second day of December, in the year of our Lord one thousand eight hundred and ninety-eight, and in the sixty-second year of Her Majesty's reign.

By His Excellency's Command,
JOSEPH COOK.

GOD SAVE THE QUEEN!

Department of Agriculture,
Brisbane, 25th May, 1899.

HIS Excellency the Governor, with the advice of the Executive Council, has, in pursuance of the provisions of "*The Slaughtering Act of* 1898," been pleased to make the following Regulations.

J. V. CHATAWAY.

REGULATIONS UNDER "THE SLAUGHTERING ACT OF 1898."

Definitions.

1. Save as herein otherwise provided, in these Regulations the terms used have the meanings respectively assigned to them by "*The Slaughtering Act of* 1898."

The term "Stock" means and includes cattle, sheep, and swine;

The term "Licensing Court" means a Police Magistrate or if he is absent or there is no Police Magistrate, then any two justices sitting in a Court of Petty Sessions having jurisdiction in the district within which a slaughter-house is or is proposed to be established;

The term "Inspector" means the inspector (if any) to whom a district is assigned, or if he is absent, or there is no such inspector then any inspector appointed under the provisions of "*The Slaughtering Act of* 1898";

The term "Owner of stock" means the owner whether jointly or severally of the stock, or the authorised agent or superintendent of the owner, or the drover or person in charge of the stock.

Unlicensed slaughter-house.

2. Any person who establishes or keeps an unlicensed slaughter-house is guilty of an offence against these Regulations.

Illegal slaughter.

3. No person shall slaughter at any place other than at a licensed slaughter-house any stock the flesh of which is intended to be used for meat.

Licensing Court.

4. Subject to these Regulations, the Licensing Court may license slaughter-houses established or proposed to be established within a district.

Application.

5. Every person who desires to obtain a license or the renewal of a license for a slaughter-house shall make an application therefor in writing in the form in the First Schedule hereto or to the like effect.

Time for applying.

6. Every application shall be addressed to the Licensing Court of the district within which the slaughter-house is or is proposed to be established, shall be lodged with the proper Clerk of Petty Sessions, and shall be accompanied by the license fee hereinafter prescribed. Applications for licenses shall be so lodged on or before the fourteenth day of December, March, June, and September in each year. Applications for the renewal of licenses shall be so lodged on or before the fourteenth day of December in each year.

Duty of clerk of petty sessions.

7. Upon the receipt of every such application, the clerk of petty sessions shall forthwith forward a copy of the same to the local authority of the district and also to the inspector.

Representatives of local authority.

8. The local authority of the district may make to the Licensing Court such representations, in writing or otherwise, with respect to every such application, as the local authority thinks fit.

Report of inspector.

9. It shall be the duty of the inspector, upon the receipt of every such copy of an application, to inspect the premises in respect of which a license or the renewal of a license is applied for, and to report thereon to the Licensing Court. He shall either make such report in writing under his hand, or, if directed so to do by the chief inspector, shall personally attend at the sittings of the Licensing Court, and there orally report to the Court upon the same.

The hearing.

10. The Licensing Court shall sit for the hearing and determination of all applications for licenses on the first Tuesday in the months of January, April, July, and October in every year.

The Licensing Court shall sit for the hearing and determination of all applications for the renewal of licenses on the first Tuesday in the month of January in every year.

After considering the report of the inspector and the representations, if any, of the local authority of the district, the Court may, subject to these Regulations—

(1) Grant the application; or

(2) Adjourn the application for the purpose of the execution by the applicant of such works as in the opinion of the Licensing Court are necessary to render the premises suitable and proper for the slaughter of stock; or

(3) Refuse the application.

Duration of license.

11. Save as hereinafter provided, a license for a slaughter-house shall remain in force for the period of one year, but may from time to time be renewed for a like period. Provided that a new license granted for a slaughter-house shall only remain in force until the sitting of the Licensing Court held in the month of January following the date on which such license was granted. Provided further that all existing licenses shall remain in force until the sitting of the Licensing Court held in the month of January next.

Fees for licenses.

12. The annual fee payable in respect of the license or the renewal of the license of a slaughter-house shall be twenty shillings.

Fees for defraying expenses.

13. The fees payable by the licensee of a slaughter-house for the purpose of defraying the expenses of inspection shall be as follows, that is to say:—

	s.	d.
For every bullock, steer, cow, or heifer slaughtered ...	0	3
For every 12 sheep or calves slaughtered	0	3
For every head of swine slaughtered	0	3

Such fees shall be paid by the licensee to the inspector monthly, or at such shorter intervals as the inspector may require.

Receipt.

14. The inspector shall, upon the payment of such fees, give to the licensee a receipt under his hand in the form of the Second Schedule hereto.

Delivery note.

15. When stock are delivered at a slaughter-house to be slaughtered, the owner of the stock shall deliver to the owner of the slaughter-house a way bill or delivery note of the stock, setting forth the number, the description, and the brands or marks of the stock, and signed by the owner thereof.

The owner of the slaughter-house shall retain and preserve every such way bill or delivery note, and shall, on demand, produce the same to the inspector.

Slaughtering book.

16. The licensee of every slaughter-house shall keep a book called a "Slaughtering Book," in which shall be correctly recorded all the particulars set out in the Third Schedule hereto; and such book shall be open at all reasonable times to the inspection of any inspector, or any inspector of brands or police officer, who may make any copy of or extract therefrom.

Floors.

17. The floor of every place in a slaughter-house where stock are pithed or slaughtered, or where meat is dressed, prepared, treated, or stored, shall, if required by the inspector, be constructed of concrete or otherwise rendered impervious, to his satisfaction.

Drainage; ventilation.

18. Every slaughter-house shall be drained and ventilated to the satisfaction of the Inspector.

Blood.

19. In every slaughter-house all blood shall be boiled, desiccated, or otherwise treated to the satisfaction of the Inspector.

Privies.

20. Every water-closet, privy, cesspool, and urinal used in connection with a slaughter-house shall be situated at a distance of not less than one hundred yards from any building, enclosure, or place in or at which stock are slaughtered or meat is dressed, prepared, treated, or stored.

Pigsties.

21. Every pigsty, enclosure, and place where swine are kept at a slaughter-house shall be situated at a distance of not less than two hundred and fifty yards from any building, enclosure, or place in or at which stock are slaughtered or meat is dressed, prepared, treated, or stored.

Offal to swine.

22. Swine shall not be fed with offal at a slaughter-house, nor shall any offal be removed therefrom for the purpose of feeding swine, unless such offal has first been thoroughly cooked.

Notice of slaughtering.

23. The owner of every slaughter-house shall give to the inspector such notice of his intention to slaughter stock as will enable the inspector to inspect such stock.

Tampering with meat.

24. Until stock slaughtered have been inspected by the inspector the pleuræ are not to be stripped or otherwise interfered with, and no part of the carcass is to be cut away, manipulated, or interfered with in any manner which may prevent the discovery of disease or may alter the true condition of the meat.

The inspector may condemn any stock or meat which in his opinion has been dealt with in contravention of the provisions of this Regulation.

Branding meat.

25. When the inspector has inspected any meat and approved of the same, he shall brand each separate quarter of beef and each carcass or quarter of mutton with a mark or stamp.

Any person who wilfully removes or obliterates any such mark or stamp, or who, not being an inspector, affixes or causes to be affixed to any meat any such mark or stamp, is guilty of an offence against these Regulations.

Calves.

26. Calves less than four weeks old are not to be slaughtered for meat.

Condemned meat.

27. Condemned meat at a slaughter-house shall be rendered unfit for the food of man in the mode directed by the inspector.

Removal of hides, &c.

28. Offal and the hides, skins, heads, and feet of stock slaughtered at a slaughter-house shall only be removed from the premises in the manner and at the times directed by the inspector.

The contents of paunches and of intestines shall be deposited in the place appointed by the inspector for the purpose.

Carriage of meat.

29. Meat shall be carried from the slaughter-house to the butcher's shop in vehicles approved by the inspector.

Every such vehicle shall be provided with a proper roof, and shall be so constructed as to permit of a free current of air.

Meat shall be carried in such vehicle either suspended from the roof or sides thereof, or so arranged that a free current of air may circulate between the carcasses or portions of carcasses being carried.

Blowing meat, &c.

30. No person shall blow with his breath or otherwise into any meat, or eject any salt, liquid matter, or other substance from his mouth thereon.

No person shall treat, dress, or prepare any meat by means of any preservative or other substance which, in the opinion of the inspector, injures, or is likely to injure, such meat or to render it unfit for the food of man.

Offences.

31. Any person who contravenes any of the provisions of these Regulations is guilty of an offence, and is liable to a penalty not exceeding fifty pounds.

When a licensee of a slaughter-house, having been convicted of an offence against "*The Slaughtering Act of* 1898" or these Regulations, is on a second or subsequent occasion convicted of an offence against such Act or Regulations, the Court, by or before whom he is so convicted as last aforesaid, may, in addition to the punishment for such offence, order the license of the slaughter-house to be suspended for such time as the Court thinks fit, or to be absolutely cancelled, and such license shall be so suspended or cancelled accordingly.

FIRST SCHEDULE.

APPLICATION FOR A LICENSE OR THE RENEWAL OF A LICENSE OF A SLAUGHTER-HOUSE.

"*The Slaughtering Act of* 1898."

To the Licensing Court for the District of [*name of District*].

I [*or* we] hereby apply to the Licensing Court to be holden for the district of [*name of district*] for a license [*or* the renewal of a license] of a slaughter-house proposed to be established [*or* established] at [*describe locality so as to clearly identify it*].

Dated at the day of

Applicant.

SECOND SCHEDULE.

RECEIPT.

"*The Slaughtering Act of* 1898."

I have this day received from [*name of licensee or licensees*] the sum of £ , being fees in respect of stock slaughtered at the slaughter-house at [*situation of slaughter-house*], whereof he is the licensee [*or* they are the licensees], between the day of and the day of .

The particulars of the stock are as follow :—

Cattle [*insert number*]
Sheep and Calves [*insert number*]
Swine [*insert number*]

Dated at the day of

Inspector.

THIRD SCHEDULE.

SLAUGHTERING BOOK.

Date of Slaughtering.	Number of Stock Slaughtered.			Person from whom Stock obtained.	Brands or Marks.
	Cattle.	Sheep.	Swine.		

REGULATIONS UNDER "THE SLAUGHTERING ACT OF 1898."

Department of Agriculture,
Brisbane, 15th November, 1899.

HIS Excellency the Lieutenant-Governor, with the advice of the Executive Council, has, in pursuance of the provisions of "*The Slaughtering Act of* 1898," been pleased to make the following additional Regulation.

J. V. CHATAWAY.

32. Clause 12 of the Regulations under "*The Slaughtering Act of* 1898," dated the twenty-fifth day of May, 1899, and published in the *Government Gazette* dated the twenty-seventh day of May, 1899, is amended by the addition of the following paragraph :—

Provided that the annual fee payable in respect of such license or renewal of such license issued to persons who only slaughter calves and pigs, but not exceeding five head in all in any week, shall be two shillings and sixpence.

THE QUEENSLAND GOVERNMENT MINING JOURNAL.

We have great pleasure in welcoming the first number of the *Mining Journal*, issued under the direction of the Hon. the Secretary for Mines. The "get-up" of the *Journal* is decidedly artistic, and we congratulate the Editor, Mr. W. O. Hodgkinson, on the taste shown in the frontispiece and in the excellent map of Queensland, showing the gold and mineral fields of the colony. Already, in this first issue, we are supplied with such a varied amount of valuable information on matters pertaining to the mining industry generally, that we may feel assured of the *Journal* proving still more interesting in the future. One feature we are pleased to notice—that is, that the Editor has successfully aimed at producing a readable paper, and has not disdained to make reference to matters of interest to the community, although not directly bearing on the subject of mining. The *Journal* has made a highly successful *débût*, and those who know its Editor may be sure that its value as a record of the doings of the mining world will increase with each succeeding number.

By Authority: EDMUND GREGORY, Government Printer, William street, Brisbane.

Public Announcements.

The Editor will be glad to receive any papers of special merit which may be read at meetings of Agricultural and Pastoral Associations in Queensland, reserving, however, the right to decide whether their value and importance will justify their publication.

The *Queensland Agricultural Journal* will be supplied to all members of Agricultural and Horticultural Societies who do not derive their livelihood solely from the land, on payment, in advance, of an annual subscription of 5s.

ADVERTISEMENTS.

Advertisements which relate wholly to the sale of Agricultural Machinery, Seeds, Plants, Manures, Farm Stock, Feeding Stuff, &c., will be inserted in the *Journal* at the following rates:—

	£	s.	d.
Full page, per issue	4	0	0
Half page, per issue	2	10	0
Quarter page, per issue	1	10	0

On advertisements standing for six months a discount of 15 per cent. will be allowed, and 25 per cent. on those inserted for twelve months.

SISAL HEMP PLANTS.

The Department of Agriculture having a quantity of sisal hemp plants and seedlings for gratuitous distribution, intending planters are requested to make early application for the same to the Under Secretary for Agriculture.

LIST OF AGRICULTURAL, HORTICULTURAL, AND PASTORAL SOCIETIES AND ASSOCIATIONS IN QUEENSLAND.

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Allora ...	Central Downs Agricultural and Horticultural Association	J. H. Buxton... ...	Feb.
Avondale ...	Avondale Farmers' and Planters' Association	F. E. Eggar	
Ayr	Lower Burdekin Farmers' Association ...	Winsor H. Wilmington	
Beaudesert ...	Logan and Albert Pastoral and Agricultural Society	M. Hinchcliffe ...	11 May
Beenleigh ...	Agricultural and Pastoral Society of Southern Queensland	Wilson Holliday ...	7 Sept.
Biggenden ...	Biggenden Agricultural and Pastoral Society	Charles H. Peppin ...	14 June
Biggenden ...	Biggenden Farmers' Association	Charles H. Peppin ...	
Birthamba ...	South Kolan Agricultural and General Progress Association	G. W. Nixon ...	
Blackall ...	Barcoo Pastoral Society	F. Clewett	
Boonah ...	Fassifern and Dugandan Agricultural and Pastoral Association	J. A. McBean ...	14 and 15 June
Bowen ...	Pastoral, Agricultural, and Mining Association	J. E. Smith	9 Aug.
Bowen ...	Preston Farmers' Association, Lower Proserpine	G. Archer	
Bowen ...	Preston and Mount Marlow Farmers' Association, Lower Proserpine	D. W. Lanzky ...	
Booyal ...	Booyal Farmers' Progress Association ...	Thos. Skillington ...	
Brisbane ...	Horticultural Society of Queensland	J. F. Bailey	26 and 27 April
Brisbane ...	Moreton Agricultural, Horticultural, and Industrial Association	J. Duffield	
Brisbane ...	Queensland Acclimatisation Society	E. Grimley	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Brisbane ...	National Agricultural and Industrial Association of Queensland	H. C. Wood	7, 8, 9, and 10 Aug.
Brisbane ...	Queensland Stockbreeders' and Graziers' Association	F. A. Blackman ...	
Brisbane ...	United Pastoralists' Association	Fredk. Ranson ...	
Bundaberg ...	Bundaberg Horticultural and Industrial Society	H. E. Ashley ...	
Bundaberg ...	Council of Agriculture	Jos. Campbell ...	
Bundaberg ...	Woongarra Canegrowers' and Farmers' Association	W. H. Dart	
Burpengary...	Burpengary Farmers' Association	C. H. Ham	
Byrnestown...	Byrnestown Farmers' Progress Association ...	J. Dufficy	
Caboolture ...	Caboolture Farmers' Association	G. Mallet	
Cairns ...	Aloombah Farmers' Association	Chas. R. Spencer ...	
Cairns ...	Cairns Agricultural, Pastoral, and Mining Association	A. J. Draper	28 and 29 Sept.
Cairns ...	Cairns District Coffee Growers' Association...	W. A. Hannam ...	
Cairns ...	Cairns District United Farmers' Association	Wm. Griffin ...	
Cairns ...	Hambledon Planters' Association	A. M. Stephens ...	
Charleville ..	Central Warrego Pastoral and Agricultural Association	E. F. C. Manning ...	25 and 26 May
Charters Towers	Towers Pastoral, Agricultural, and Mining Association	W. Tilley	30 and 31 May; 1 June
Childers ...	Isis Agricultural Association	H. Epps	
Childers ...	Doolbi Mill Branch, Isis Agricultural Association	W. T. H. Job ...	
Childers ...	Childers Mill Branch, Isis Agricultural Association	H. Epps	
Clermont ...	Peak Downs Pastoral, Horticultural, and Agricultural Society	F. Leysley	
Clermont ...	Peak Downs Dairymen and Settlers' Association	A. G. Pursell ...	
Cooktown ...	Cook District Pastora and Agricultural Society	W. R. Humphreys ...	
Cooran ...	Cooran Progress and Agricultural Association	Thos. Smith	
Cordalba ...	Cordalba Farmers' Association	B. Goodliffe	
Currajong ...	Currajong Farmers' Progress Association ...	Wm. Howard ...	
Cunnamulla	South Warrego Pastoral Association	J. Winward	
Dalby ...	Northern Downs Pastoral and Agricultural Association	W. M. Alexander ...	July
Dallarnil Scrub, *viâ* Degilbo	Dallarnil Farmers' Association	W. E. Burton ...	
Deception Bay	Deception Bay Farmers' Association	B. J. T. Liscombe ...	
Degilbo ...	Degilbo District Farmers' Association ...	J. Harvey	27 and 28 Dec., 1900
Gayndah ...	Gayndah Agricultural and Horticultural Association	J. C. Kerr	
Gladstone ...	Gladstone Pastoral and Agricultural Association	W. J. Manning ...	
Gooburrum, Bundaberg	Gooburrum Farmers' and Canegrowers' Association	W. J. Tutin	
Goondiwindi	MacIntyre River Pastoral and Agricultural Society	A. Warden	
Gympie ...	Agricultural, Mining, and Pastoral Society	F. Vaughan	13 and 14 Sept.
Gympie ...	Chatsworth Farmers' Progress Association ...	William Bellman ...	
Gympie ...	Deep Creek Farmers' Progress Association ...	W. Reid	
Gympie ...	Gympie Horticultural Society	Charles Brasch ...	19 and 20 April
Gympie ...	The Pie and Eel Creek Farmers' Association	Wm. H. Ryan ...	
Gympie ...	Gympie Central Farmers' and Progress Association	J. Howard Maynard	
Haslemore, Victoria, Herbert Riv.	Herbert River Farmers' League	Alfred Henry ...	
Helidon ...	Helidon Scrub Farmers' Progress Association	Jas. Tysoe	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Herbert River	Halifax Planters' Club	H. G. Faithful ...	
Herbert River	Macnade Farmers' Association...	Edwin S. Waller ...	
Herbert River	Ripple Creek Farmers' Association	J. W. Grimes ...	
Herberton ...	Mining, Pastoral, and Agricultural Association	John M. Hollway ...	3 and 4 April
Hodgson ...	Hodgson Farmers' Association	C.W. Nimmo ...	
Hughenden...	Hughenden Pastoral and Agricultural Association	H. P. Blackall ...	7 and 8 May
Ingham ...	Herbert River Farmers' Association	...	
Ingham ...	Herbert River Pastoral and Agricultural Association (Stock Show)	P. J. Cochrane ...	15 and 16 June
Ingham ...	Herbert River Pastoral and Agricultural Association (Agricultural Show)	P. J. Cochrane ...	Sept.
Ipswich ...	Ipswich and West Moreton Agricultural and Horticultural Society	P. W. Cameron ...	27 Sept.
Ipswich ...	Queensland Pastoral and Agricultural Society	Elias Harding ...	11 and 12 July
Kandanga (near Gympie)	Kandanga Farmers' Association	N. Rasmussen ...	
Kolan ...	Kolan Canegrowers' and Farmers' Association	C. Marks	
Ladeside ...	Mungore Farmers' Association...	J. M. Robinson ...	
Laidley ...	Lockyer Agricultural and Industrial Society	John Fielding ...	25 and 26 July
Loganholme...	Logan Farming and Industrial Association ...	F. W. Peek	
Longreach ...	Longreach Pastoral and Agricultural Society	J. P. Peterson ...	17 and 18 April
Lucinda Point	Victoria Farmers' Association	W. S. C. Warren ...	
Mackay ...	Agricultural, Pastoral, and Mining Association	F. Black	
Mackay ...	Pioneer River Farmers' Association	E. Swayne	28 and 29 June
Mapleton, *viâ* Nambour	Mapleton and Dulong Fruitgrowers' and Farmers' Progress Association	W. J. Smith	
Maryborough	Maryborough Horticultural Society	H. A. Jones	
Maryborough	The Island Farmers' Progress Association ...	C. A. Schmidt ...	
Maryborough	Wide Bay and Burnett Pastoral and Agricultural Society	G. Willey	4, 5, and 6 July
Miallo ...	Miallo Progress Association	E. F. Welchman ...	
Milbong ...	Milbong Farmers' Association	T. R. Garrick ...	
Mitchell ...	Mitchell and Maranoa Pastoral, Agricultural, and Vinegrowers' Association	H. J. Corbett ...	
Mosman River	Mosman River Farmers' Association	Geo. W. Muntz ...	
Mount Cotton	Mount Cotton and Tingalpa Division Fruitgrowers' and Farmers' Association	F. N. Sharman ...	
Mount Mee...	Mount Mee Farmers' Association	R. Thomas	
Mount Morgan	Mount Morgan Mining, Agricultural, Poultry, Pastoral, and Horticultural Society	G. Orford	
Mount Morgan	Mount Morgan Agricultural, Pastoral, and Poultry Society	Thos. W. Walker ...	
Mundoo ...	Johnstone River Farmers' Association ...	J. McInnes	
Nerang ...	South Queensland and Border Pastoral and Agricultural Society	W. J. Browne ...	8 Sept.
North Isis ...	North Isis Canegrowers' Association	W. J. Young ...	
Pialba ...	Pialba Farmers' Association	J. B. Stephens ...	
Pickenjennie	Wallumbilla Selectors' League	George Dalziel ...	
Pickenjennie	Pickenjennie Branch, Wallumbilla Selectors' League	George Dalziel ...	
Pinbarren ...	Pinbarren Agricultural and Progress Association	H. Armitage, senr. ...	
Port Douglas	Pastoral, Agricultural, and Mining Association	W. H. Dorrat ...	2 Aug.

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Razorback ...	The Razorback Fruitgrowers' Association ...	Robert Tinning ...	
Rockhampton	Central Queensland Farmers' and Selectors' Association	T. Whitely, Coowonga	
Rockhampton	Central Queensland Pastoral Employers' Association	G. Mackay	
Rockhampton	Central Queensland Stockowners' Association	R. R. Dawbarn ...	
Rockhampton	Rockhampton Agricultural Society	R. R. Dawbarn ...	29 and 30 May
Roma ...	Western Pastoral and Agricultural Association of Queensland	Angus McPherson ...	
Roma ...	Yingerbay Farmers' Association	Alex. C. McIntyre ...	
Rosewood ...	Farmers' Club	P. H. Adams... ...	4 Oct.
Southport ...	Southport Horticultural Society	E. Fass	19 April
Springsure ...	Queensland Pastoral Society	G. R. Milliken ...	
Stanthorpe ...	Border Pastoral, Agricultural, and Mining Society	Geo. Simcocks ...	22 and 23 Feb.
Stanthorpe ...	Stanthorpe Horticultural and Viticultural Society	R. Hoggan	
Stanwell ...	The Stanwell Agricultural Society	A. Spanner	
St. George ...	Balonne Pastoral and Agricultural Association	T. M. Cummings ...	
Tinana ...	Tinana Fruitgrowers' and Farmers' Association	Chas. Parke	
Toowoomba...	Darling Downs Horticultural Association ...	H. Hopkins	
Toowoomba...	Drayton and Toowoomba Agricultural and Horticultural Society	H. Symes	
Toowoomba...	Royal Agricultural Society of Queensland ...	F. Burtt	31 July; 1 and 2 Aug.
Townsville ...	Townsville Pastoral, Agricultural, and Industrial Association (formerly North Queensland Pastoral and Agricultural Association)	J. N. Parkes	6 and 7 June
Upper North Pine	Upper North Pine Farmers' Association ...	J. Skerman	
Wallumbilla	Wallumbilla Selectors' League	George Dalziel ..	
Warwick ...	Eastern Downs Horticultural and Agricultural Association	J. Selke	31 Jan. & 1 Feb.
Wellington Point	Wellington Point Agricultural, Horticultural, and Industrial Association	F. W. Wort	13 June
Woombye ...	Woombye Fruitgrowers' Association	P. S. Hungerford ...	
Woowoonga	Woowoonga Scrub Farmers' Association ...	H. B. Griffiths ...	
Zillmere ...	Zillmere Horticultural Society	C. McF. Fischer ...	20 Jan.

"THE DISEASES IN PLANTS ACT OF 1896."

Department of Agriculture,
Brisbane, 19th January, 1899.

HIS Excellency the Governor, with the advice of the Executive Council, and in pursuance of the provisions of "*The Diseases in Plants Act of* 1896," has been pleased to make the following further Regulations.

J. V. CHATAWAY.

THE FUMIGATION OF FRUIT FOR EXPORT.

1. Any one who wishes to erect a chamber or building for the fumigating of fruit is requested to give notice to the Under Secretary for Agriculture, who will take steps to see that the chamber or building is properly constructed.

2. When it is required to fumigate fruit for export, twenty-four hours' notice must be given to the said Under Secretary or such other officer as may be duly authorised to accept such notice.

3. The operation of fumigating must be conducted under the control of an officer authorised by the Minister for Agriculture.

4. The fumigating chamber may be made of any convenient size or material, the essential point being that it shall be capable of being closed absolutely airtight, and provided with a flue-pipe in the roof which can be opened or closed to allow of the escape of the gas after fumigation. The flue must be provided with a box or chamber to contain caustic soda or potash to destroy the gas.

The fumigating chamber must be provided with a shutter or sliding panel in the lower portion of the door or wall.

Door, flue, and shutter must all be made to close absolutely airtight.

DIRECTIONS FOR FUMIGATING WITH HYDROCYANIC ACID GAS.

Proportions of Ingredients.—For every 150 cubic feet of room take 1 ounce of cyanide of potassium, 5 fluid ounces sulphuric acid, 10 fluid ounces water.

Having placed the fruit to be fumigated in the chamber, see that the flue and the shutter in the door or lower part of all are properly closed.

The acid is then to be diluted in the following manner:—The whole of the water is placed in a shallow china or glazed earthenware vessel, such as an ordinary wash-hand basin. (Metal vessels are inadvisable unless they are leaden ones.) The sulphuric acid is next poured on to the water in a thin stream, stirring the while with a stick. Do not mix by adding the water to the acid.

The basin containing the acid thus diluted (which should be allowed to cool) is now placed in the fumigating chamber, and the cyanide of potassium is emptied into it.

The gas is given off with great violence, and the door should be immediately closed.

The whole is now to be left to itself for one hour. At the end of this time the shutters in the flue and in the door are opened, and the draught produced drives the gas out of the chamber. At the end of half an hour the door is thrown open, and if the draught has been effective there should be hardly any trace of hydrocyanic gas recognisable. The chamber may be left in this condition for another ten minutes or a quarter of an hour. The fruit is now to be moved and allowed to remain in a well ventilated place, preferably out of doors, for another half an hour. Samples of fruit will be examined from time to time by the entomologist.

Caution.—As hydrocyanic acid gas is most deadly in its effects on animal life, the greatest care must be taken in its use.

Department of Agriculture,
Brisbane, , 18 .

This is to certify that has treated cases of citrus fruit with hydrocyanic acid gas for one hour, under my supervision. These cases have been branded "Crown" over "Passed."

Shipping marks:
Per S.S.:
Consigned to:

Department of Agriculture,
Brisbane, 26th January, 1899.

THE following Proclamation by His Excellency the Governor of New South Wales is published for general information.

J. V. CHATAWAY.

NEW SOUTH WALES, to wit. (L.S.) HAMPDEN, *Governor*.

PROCLAMATION.

By His Excellency The Right Honourable HENRY ROBERT, VISCOUNT HAMPDEN, Governor and Commander-in-Chief of the Colony of New South Wales and its Dependencies.

WHEREAS the Governor is empowered by Section 9 of the "Vegetation Diseases Act, 1897," from time to time, by Proclamation in the *Gazette*, to declare any fungus or vegetable parasite whatever to be a fungus within the meaning of the said Act: Now, therefore, I, HENRY ROBERT, VISCOUNT HAMPDEN, the Governor aforesaid, with the advice of the Executive Council, do, by this my Proclamation, declare Black Spot (*Fusicladium*) to be a fungus within the meaning of the said Act.

Given under my Hand and Seal, at Government House, Sydney, this twenty-second day of December, in the year of our Lord one thousand eight hundred and ninety-eight, and in the sixty-second year of Her Majesty's reign.

By His Excellency's Command,

JOSEPH COOK.

GOD SAVE THE QUEEN!

Department of Agriculture,
Brisbane, 25th May, 1899.

HIS Excellency the Governor, with the advice of the Executive Council, has, in pursuance of the provisions of "*The Slaughtering Act of* 1898," been pleased to make the following Regulations.

J. V. CHATAWAY.

REGULATIONS UNDER "THE SLAUGHTERING ACT OF 1898."

Definitions.

1. Save as herein otherwise provided, in these Regulations the terms used have the meanings respectively assigned to them by "*The Slaughtering Act of* 1898."

The term "Stock" means and includes cattle, sheep, and swine;

The term "Licensing Court" means a Police Magistrate or if he is absent or there is no Police Magistrate, then any two justices sitting in a Court of Petty Sessions having jurisdiction in the district within which a slaughter-house is or is proposed to be established;

The term "Inspector" means the inspector (if any) to whom a district is assigned, or if he is absent, or there is no such inspector then any inspector appointed under the provisions of "*The Slaughtering Act of* 1898";

The term "Owner of stock" means the owner whether jointly or severally of the stock, or the authorised agent or superintendent of the owner, or the drover or person in charge of the stock.

Unlicensed slaughter-house.

2. Any person who establishes or keeps an unlicensed slaughter-house is guilty of an offence against these Regulations.

Illegal slaughter.

3. No person shall slaughter at any place other than at a licensed slaughter-house any stock the flesh of which is intended to be used for meat.

Licensing Court.

4. Subject to these Regulations, the Licensing Court may license slaughter-houses established or proposed to be established within a district.

Application.

5. Every person who desires to obtain a license or the renewal of a license for a slaughter-house shall make an application therefor in writing in the form in the First Schedule hereto or to the like effect.

Time for applying.

6. Every application shall be addressed to the Licensing Court of the district within which the slaughter-house is or is proposed to be established, shall be lodged with the proper Clerk of Petty Sessions, and shall be accompanied by the license fee hereinafter prescribed. Applications for licenses shall be so lodged on or before the fourteenth day of December, March, June, and September in each year. Applications for the renewal of licenses shall be so lodged on or before the fourteenth day of December in each year.

Duty of clerk of petty sessions.

7. Upon the receipt of every such application, the clerk of petty sessions shall forthwith forward a copy of the same to the local authority of the district and also to the inspector.

Representatives of local authority.

8. The local authority of the district may make to the Licensing Court such representations, in writing or otherwise, with respect to every such application, as the local authority thinks fit.

Report of inspector.

9. It shall be the duty of the inspector, upon the receipt of every such copy of an application, to inspect the premises in respect of which a license or the renewal of a license is applied for, and to report thereon to the Licensing Court. He shall either make such report in writing under his hand, or, if directed so to do by the chief inspector, shall personally attend at the sittings of the Licensing Court, and there orally report to the Court upon the same.

The hearing.

10. The Licensing Court shall sit for the hearing and determination of all applications for licenses on the first Tuesday in the months of January, April, July, and October in every year.

The Licensing Court shall sit for the hearing and determination of all applications for the renewal of licenses on the first Tuesday in the month of January in every year.

After considering the report of the inspector and the representations, if any, of the local authority of the district, the Court may, subject to these Regulations—

(1) Grant the application; or

(2) Adjourn the application for the purpose of the execution by the applicant of such works as in the opinion of the Licensing Court are necessary to render the premises suitable and proper for the slaughter of stock; or

(3) Refuse the application.

Duration of license.

11. Save as hereinafter provided, a license for a slaughter-house shall remain in force for the period of one year, but may from time to time be renewed for a like period. Provided that a new license granted for a slaughter-house shall only remain in force until the sitting of the Licensing Court held in the month of January following the date on which such license was granted. Provided further that all existing licenses shall remain in force until the sitting of the Licensing Court held in the month of January next.

Fees for licenses.

12. The annual fee payable in respect of the license or the renewal of the license of a slaughter-house shall be twenty shillings.

Fees for defraying expenses.

13. The fees payable by the licensee of a slaughter-house for the purpose of defraying the expenses of inspection shall be as follows, that is to say:—

	s.	d.
For every bullock, steer, cow, or heifer slaughtered ...	0	3
For every 12 sheep or calves slaughtered	0	3
For every head of swine slaughtered	0	3

Such fees shall be paid by the licensee to the inspector monthly, or at such shorter intervals as the inspector may require.

Receipt.

14. The inspector shall, upon the payment of such fees, give to the licensee a receipt under his hand in the form of the Second Schedule hereto.

Delivery note.

15. When stock are delivered at a slaughter-house to be slaughtered, the owner of the stock shall deliver to the owner of the slaughter-house a way bill or delivery note of the stock, setting forth the number, the description, and the brands or marks of the stock, and signed by the owner thereof.

The owner of the slaughter-house shall retain and preserve every such way bill or delivery note, and shall, on demand, produce the same to the inspector.

Slaughtering book.

16. The licensee of every slaughter-house shall keep a book called a "Slaughtering Book," in which shall be correctly recorded all the particulars set out in the Third Schedule hereto; and such book shall be open at all reasonable times to the inspection of any inspector, or any inspector of brands or police officer, who may make any copy of or extract therefrom.

Floors.

17. The floor of every place in a slaughter-house where stock are pithed or slaughtered, or where meat is dressed, prepared, treated, or stored, shall, if required by the inspector, be constructed of concrete or otherwise rendered impervious, to his satisfaction.

Drainage; ventilation.

18. Every slaughter-house shall be drained and ventilated to the satisfaction of the Inspector.

Blood.

19. In every slaughter-house all blood shall be boiled, desiccated, or otherwise treated to the satisfaction of the Inspector.

Privies.

20. Every water-closet, privy, cesspool, and urinal used in connection with a slaughter-house shall be situated at a distance of not less than one hundred yards from any building, enclosure, or place in or at which stock are slaughtered or meat is dressed prepared, treated, or stored.

Pigsties.

21. Every pigsty, enclosure, and place where swine are kept at a slaughter-house shall be situated at a distance of not less than two hundred and fifty yards from any building, enclosure, or place in or at which stock are slaughtered or meat is dressed, prepared, treated, or stored.

Offal to swine.

22. Swine shall not be fed with offal at a slaughter-house, nor shall any offal be removed therefrom for the purpose of feeding swine, unless such offal has first been thoroughly cooked.

Notice of slaughtering.

23. The owner of every slaughter-house shall give to the inspector such notice of his intention to slaughter stock as will enable the inspector to inspect such stock.

Tampering with meat.

24. Until stock slaughtered have been inspected by the inspector the pleuræ are not to be stripped or otherwise interfered with, and no part of the carcass is to be cut away, manipulated, or interfered with in any manner which may prevent the discovery of disease or may alter the true condition of the meat.

The inspector may condemn any stock or meat which in his opinion has been dealt with in contravention of the provisions of this Regulation.

Branding meat.

25. When the inspector has inspected any meat and approved of the same, he shall brand each separate quarter of beef and each carcass or quarter of mutton with a mark or stamp.

Any person who wilfully removes or obliterates any such mark or stamp, or who, not being an inspector, affixes or causes to be affixed to any meat any such mark or stamp, is guilty of an offence against these Regulations.

Calves.

26. Calves less than four weeks old are not to be slaughtered for meat.

Condemned meat.

27. Condemned meat at a slaughter-house shall be rendered unfit for the food of man in the mode directed by the inspector.

Removal of hides, &c.

28. Offal and the hides, skins, heads, and feet of stock slaughtered at a slaughter-house shall only be removed from the premises in the manner and at the times directed by the inspector.

The contents of paunches and of intestines shall be deposited in the place appointed by the inspector for the purpose.

Carriage of meat.

29. Meat shall be carried from the slaughter-house to the butcher's shop in vehicles approved by the inspector.

Every such vehicle shall be provided with a proper roof, and shall be so constructed as to permit of a free current of air.

Meat shall be carried in such vehicle either suspended from the roof or sides thereof, or so arranged that a free current of air may circulate between the carcasses or portions of carcasses being carried.

Blowing meat, &c.

30. No person shall blow with his breath or otherwise into any meat, or eject any salt, liquid matter, or other substance from his mouth thereon.

No person shall treat, dress, or prepare any meat by means of any preservative or other substance which, in the opinion of the inspector, injures, or is likely to injure, such meat or to render it unfit for the food of man.

Offences.

31. Any person who contravenes any of the provisions of these Regulations is guilty of an offence, and is liable to a penalty not exceeding fifty pounds.

When a licensee of a slaughter-house, having been convicted of an offence against "*The Slaughtering Act of* 1898" or these Regulations, is on a second or subsequent occasion convicted of an offence against such Act or Regulations, the Court, by or before whom he is so convicted as last aforesaid, may, in addition to the punishment for such offence, order the license of the slaughter-house to be suspended for such time as the Court thinks fit, or to be absolutely cancelled, and such license shall be so suspended or cancelled accordingly.

FIRST SCHEDULE.

Application for a License or the Renewal of a License of a Slaughter-house.

"*The Slaughtering Act of* 1898."

To the Licensing Court for the District of [*name of District*].

I [*or* we] hereby apply to the Licensing Court to be holden for the district of [*name of district*] for a license [*or* the renewal of a license] of a slaughter-house proposed to be established [*or* established] at [*describe locality so as to clearly identify it*].

Dated at the day of

Applicant.

SECOND SCHEDULE.

Receipt.

"*The Slaughtering Act of* 1898."

I have this day received from [*name of licensee or licensees*] the sum of £ , being fees in respect of stock slaughtered at the slaughter-house at [*situation of slaughter-house*], whereof he is the licensee [*or* they are the licensees], between the day of and the day of .

The particulars of the stock are as follow :—

Cattle [*insert number*]
Sheep and Calves [*insert number*]
Swine [*insert number*]

Dated at the day of

Inspector.

THIRD SCHEDULE.

Slaughtering Book.

Date of Slaughtering.	Number of Stock Slaughtered.			Person from whom Stock obtained.	Brands or Marks.
	Cattle.	Sheep.	Swine.		

REGULATIONS UNDER "THE SLAUGHTERING ACT OF 1898."

Department of Agriculture,
Brisbane, 15th November, 1899.

HIS Excellency the Lieutenant-Governor, with the advice of the Executive Council, has, in pursuance of the provisions of "*The Slaughtering Act of* 1898," been pleased to make the following additional Regulation.

J. V. CHATAWAY.

32. Clause 12 of the Regulations under "*The Slaughtering Act of* 1898," dated the twenty-fifth day of May, 1899, and published in the *Government Gazette* dated the twenty-seventh day of May, 1899, is amended by the addition of the following paragraph :—

Provided that the annual fee payable in respect of such license or renewal of such license issued to persons who only slaughter calves and pigs, but not exceeding five head in all in any week, shall be two shillings and sixpence.

By Authority: Edmund Gregory, Government Printer, William street, Brisbane.

Public Announcements.

The Editor will be glad to receive any papers of special merit which may be read at meetings of Agricultural and Pastoral Associations in Queensland, reserving, however, the right to decide whether their value and importance will justify their publication.

The *Queensland Agricultural Journal* will be supplied to all members of Agricultural and Horticultural Societies who do not derive their livelihood solely from the land, on payment, in advance, of an annual subscription of 5s.

ADVERTISEMENTS.

Advertisements which relate wholly to the sale of Agricultural Machinery, Seeds, Plants, Manures, Farm Stock, Feeding Stuff, &c., will be inserted in the *Journal* at the following rates :—

	£	s.	d.
Full page, per issue	4	0	0
Half page, per issue	2	10	0
Quarter page, per issue	1	10	0

On advertisements standing for six months a discount of 15 per cent. will be allowed, and 25 per cent. on those inserted for twelve months.

SISAL HEMP PLANTS.

The Department of Agriculture having a quantity of sisal hemp plants and seedlings for gratuitous distribution, intending planters are requested to make early application for the same to the Under Secretary for Agriculture.

LIST OF AGRICULTURAL, HORTICULTURAL, AND PASTORAL SOCIETIES AND ASSOCIATIONS IN QUEENSLAND.

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Allora ...	Central Downs Agricultural and Horticultural Association	J. H. Buxton... ...	Feb.
Ayr	Lower Burdekin Farmers' Association ...	Winsor H. Wilmington	
Beaudesert ...	Logan and Albert Pastoral and Agricultural Society	M. Hinchcliffe ...	11 May
Beenleigh ...	Agricultural and Pastoral Society of Southern Queensland	Wilson Holliday ...	7 Sept.
Biggenden ...	Biggenden Agricultural and Pastoral Society	Charles H. Peppin ...	14 June
Birthamba ...	South Kolan Agricultural and General Progress Association	G. W. Nixon ...	
Blackall ...	Barcoo Pastoral Society	F. Clewett	
Boonah ...	Fassifern and Dugandan Agricultural and Pastoral Association	J. A. McBean ...	14 and 15 June
Bowen ...	Pastoral, Agricultural, and Mining Association	J. E. Smith	9 Aug.
Bowen ...	Preston Farmers' Association, Lower Proserpine	G. Archer	
Bowen ...	Preston and Mount Marlow Farmers' Association, Lower Proserpine	D. W. Lanzky ...	
Bowen ...	Proserpine Farmers and Settlers' Association	Joseph Cooper ...	
Booyal ...	Booyal Farmers' Progress Association ...	Thos. Skillington ...	
Brisbane ...	Horticultural Society of Queensland	J. F. Bailey	26 and 27 April
Brisbane ...	Queensland Acclimatisation Society	E. Grimley	
Brisbane ...	National Agricultural and Industrial Association of Queensland	H. C. Wood	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Brisbane ...	Queensland Stockbreeders and Graziers' Association	F. A. Blackman ..	
Brisbane ...	United Pastoralists' Association	Fredk. Ranson ...	
Bundaberg ...	Bundaberg Horticultural and Industrial Society	H. E. Ashley ...	
Bundaberg ...	Council of Agriculture	Jos. Campbell ...	
Bundaberg ...	Woongarra Canegrowers and Farmers' Association	W. H. Dart	
Burpengary...	Burpengary Farmers' Association	C. H. Ham	
Byrnestown...	Byrnestown Farmers' Progress Association ...	J. Dufficy	
Caboolture ...	Caboolture Farmers' Association	G. Mallet	
Cairns ...	Aloombah Farmers' Association	Chas. R. Spencer ...	
Cairns ...	Cairns Agricultural, Pastoral, and Mining Association	A. J. Draper... ...	5 and 6 Sept.
Cairns ...	Cairns District Coffee-growers' Association ...	W. A. Hannam ...	
Cairns ...	Cairns District United Farmers' Association	Wm. Griffin ...	
Cairns ...	Hambledon Planters' Association	A. M. Stephens ...	
Charleville ..	Central Warrego Pastoral and Agricultural Association	E. F. C. Manning ...	25 and 26 May
Charters Towers	Towers Pastoral, Agricultural, and Mining Association	W. Tilley	30 and 31 May; 1 June
Childers ...	Isis Agricultural Association	H. Epps	
Childers ...	Doolbi Mill Branch, Isis Agricultural Association	W. T. H. Job ...	
Childers ...	Childers Mill Branch, Isis Agricultural Association	H. Epps	
Clermont ...	Peak Downs Pastoral, Horticultural, and Agricultural Society	F. Leysley	
Clermont ...	Peak Downs Dairymen and Settlers' Association	A. G. Pursell ...	
Cooktown ..	Cook District Pastoral and Agricultural Society	W. R. Humphreys ...	
Cooran ...	Cooran Progress and Agricultural Association	Thos. Smith	
Cordalba ...	Cordalba Farmers' Association	B. Goodliffe	
Currajong ...	Currajong Farmers' Progress Association ...	Wm. Howard ...	
Cunnamulla	South Warrego Pastoral Association	J. Winward	
Dalby ...	Northern Downs Pastoral and Agricultural Association	W. M. Alexander ...	July
Dallarnil Scrub, *viâ* Degilbo	Dallarnil Farmers' Association	W. E. Burton ...	
Deception Bay	Deception Bay Farmers' Association	B. J. T. Liscombe ...	
Degilbo ...	Degilbo District Farmers' Association ...	J. Harvey	27 and 28 Dec., 1900
Gayndah ...	Gayndah Agricultural and Horticultural Association	J. C. Kerr	
Gladstone ...	Gladstone Pastoral and Agricultural Association	W. J. Manning ...	
Gooburrum, Bundaberg	Gooburrum Farmers and Canegrowers' Association	W. J. Tutin	
Goondiwindi	MacIntyre River Pastoral and Agricultural Society	A. Warden	
Gympie ...	Agricultural, Mining, and Pastoral Society	F. Vaughan	13 and 14 Sept.
Gympie ...	Chatsworth Farmers' Progress Association ...	William Bellman ...	
Gympie ...	Deep Creek Farmers' Progress Association ...	W. Reid	
Gympie ...	Gympie Horticultural Society	Charles Brasch ...	19 and 20 April
Gympie ...	The Pie and Eel Creek Farmers' Association	Wm. H. Ryan ...	
Gympie ...	Gympie Central Farmers and Progress Association	J. Howard Maynard	
Haslemore, Victoria, Herbert Riv.	Herbert River Farmers' League	Alfred Henry ...	
Helidon ...	Helidon Scrub Farmers' Progress Association	Jas. Tysoe	
Herbert River	Halifax Planters' Club	H. G. Faithful ...	
Herbert River	Macnade Farmers' Association...	Edwin S. Waller ...	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Herbert River	Ripple Creek Farmers' Association	J. W. Grimes ...	
Herberton ...	Mining, Pastoral, and Agricultural Association	John M. Hollway ...	3 and 4 April
Hodgson ...	Hodgson Farmers' Association	C.W. Nimmo ...	
Hughenden ...	Hughenden Pastoral and Agricultural Association	H. P. Blackall ...	7 and 8 May
Ingham ...	Herbert River Farmers' Association	...	
Ingham ...	Herbert River Pastoral and Agricultural Association (Agricultural Show)	P. J. Cochrane ...	Sept.
Ipswich ...	Ipswich and West Moreton Agricultural and Horticultural Society	P. W. Cameron ...	27 Sept.
Ipswich ...	Queensland Pastoral and Agricultural Society	Elias Harding ...	11 and 12 July
Kandanga (near Gympie)	Kandanga Farmers' Association	N. Rasmussen ...	
Kolan ...	Kolan Canegrowers and Farmers' Association	C. Marks	
Ladeside ...	Mungore Farmers' Association	I. M. Robinson ...	
Laidley ...	Lockyer Agricultural and Industrial Society	John Fielding ...	25 and 26 July
Loganholme...	Logan Farming and Industrial Association ...	F. W. Peek	
Longreach ...	Longreach Pastoral and Agricultural Society	J. P. Peterson ...	17 and 18 April
Lucinda Point	Victoria Farmers' Association	W. S. C. Warren ...	
Mackay ...	Agricultural, Pastoral, and Mining Association	F. Black	
Mackay ...	Pioneer River Farmers' Association	E. Swayne	28 and 29 June
Mapleton, *viâ* Nambour	Mapleton and Dulong Fruitgrowers and Farmers' Progress Association	W. J. Smith	
Maryborough	Maryborough Horticultural Society	H. A. Jones	
Maryborough	The Island Farmers' Progress Association ...	C. A. Schmidt ...	
Maryborough	Wide Bay and Burnett Pastoral and Agricultural Society	G. Willey	4, 5, and 6 July
Miallo ...	Miallo Progress Association	E. F. Welchman ...	
Miara, Yandaran	Avondale Farmers and Planters' Association	F. E. Eggar	
Milbong ...	Milbong Farmers' Association	T. R. Garrick ...	
Mitchell ...	Mitchell and Maranoa Pastoral, Agricultural, and Vinegrowers' Association	H. J. Corbett ...	
Mosman River	Mosman River Farmers' Association	Geo. W. Muntz ...	
Mount Cotton	Mount Cotton and Tingalpa Division Fruitgrowers and Farmers' Association	F. N. Sharman ...	
Mount Mee...	Mount Mee Farmers' Association	R. Thomas	
Mount Morgan	Mount Morgan Agricultural, Pastoral, and Poultry Society	Thos. W. Walker ...	
Mundoo ...	Johnstone River Farmers' Association ...	J. McInnes	
Nerang ...	South Queensland and Border Pastoral and Agricultural Society	W. J. Browne ...	5 Oct.
North Isis ...	North Isis Canegrowers' Association	W. J. Young ...	
North Pine ...	Moreton Agricultural, Horticultural, and Industrial Association	J. Duffield	
Pialba ...	Pialba Farmers' Association	J. B. Stephens ...	
Pinbarren ...	Pinbarren Agricultural and Progress Association	H. Armitage, senr. ...	
Port Douglas	Pastoral, Agricultural, and Mining Association	W. H. Dorrat ...	2 Aug.
Razorback ...	The Razorback Fruitgrowers' Association ...	Robert Tinning ...	
Rockhampton	Central Queensland Farmers and Selectors' Association	T. Whitely, Coowonga	
Rockhampton	Central Queensland Stockowners' Association	R. R. Dawbarn ...	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Rockhampton	Rockhampton Agricultural Society	R. R. Dawbarn ...	29 and 30 May
Roma ...	Western Pastoral and Agricultural Association of Queensland	Angus McPherson ...	
Roma ...	Yingerbay Farmers' Association	Alex. C. McIntyre ...	
Rosewood ..	Farmers' Club	P. H. Adams... ...	4 Oct.
Southport ...	Southport Horticultural Society	E. Fass	19 April
Springsure ...	Queensland Pastoral Society	G. R. Milliken ...	
Stanthorpe ...	Border Pastoral, Agricultural, and Mining Society	Geo. Simcocks ...	22 and 23 Feb.
Stanthorpe ...	Stanthorpe Horticultural and Viticultural Society	R. Hoggan	
Stanwell ...	The Stanwell Agricultural Society	A. Spanner	
St. George ...	Balonne Pastoral and Agricultural Association	T. M. Cummings ...	
Tinana ...	Tinana Fruitgrowers and Farmers' Association	Chas. Parke	
Toowoomba...	Darling Downs Horticultural Association ...	H. Hopkins	
Toowoomba...	Drayton and Toowoomba Agricultural and Horticultural Society	H. Symes	
Toowoomba...	Royal Agricultural Society of Queensland ...	F. Burtt	31 July; 1 and 2 Aug.
Townsville ...	Townsville Pastoral, Agricultural, and Industrial Association (formerly North Queensland Pastoral and Agricultural Association)	J. N. Parkes	6 and 7 June
Upper North Pine	Upper North Pine Farmers' Association ...	J. Skerman	
Wallumbilla	Wallumbilla Selectors' League	George Dalziel ..	
Warwick ...	Eastern Downs Horticultural and Agricultural Association	J. Selke	31 Jan. & 1 Feb.
Wellington Point	Wellington Point Agricultural, Horticultural, and Industrial Association	F. W. Wort	13 June
Woombye ...	Woombye Fruitgrowers' Association	P. S. Hungerford ...	
Woowoonga	Woowoonga Scrub Farmers' Association ...	H. B. Griffiths ...	
Zillmere ...	Zillmere Horticultural Society	C. M. F. Fischer ...	20 Jan.

GOVERNMENT AGRICULTURAL LABORATORY.

INSTRUCTION FOR THE COLLECTION OF SAMPLES, AND SCALE OF FEES.

GENERAL INSTRUCTIONS.

1. All analyses are carried out in their turn as they arrive at the Laboratory.

2. Should a customer wish for an immediate analysis, the fee, as provided by scale of fees below, will be increased by 50 per cent.

3. The samples may be forwarded by parcel post or by rail, either to the Under Secretary for Agriculture, Brisbane, or direct to the Chemist, Agricultural Laboratory, at the Agricultural College, Gatton; but in any case the required fee must be transmitted at the same time.

4. Analyses will be only carried out, if samples are taken strictly in accordance with the instructions issued below.

SCALE OF FEES.

	Farmers, Selectors, Gardeners. £	s.	d.
Soil—Short analysis (estimation of lime, alkalies, nitrogen, and phosphoric acid) ...	2	2	0
Soil and subsoil—Short analysis ...	3	3	0
Soil—Complete analysis ...	4	4	0
Water—Analysis ...	3	3	0
Manures—			
Complete analysis ...	2	2	0
Nitrogen only ...	0	7	6
Potash only ...	0	7	6
Phosphoric acid sol. ...	0	15	0
Phosphoric acid insol. ...	0	15	0

SCALE OF FEES—*continued.*

	Farmers, Selectors, Gardeners. £ s. d.
Food Stuffs—	
Complete analysis	2 2 0
Water only	0 5 0
Albuminoids	0 10 0
Oil or fat	0 7 6
Ash	0 5 0
Fibre	0 7 6
Sugar-cane, sugar-beet, megass—Analysis of	1 1 0
Sugar, massecuite, jelly, molasses	1 1 0
Milk, butter, cheese—Complete analysis	1 0 0
Tanning materials (tannin estim.)	1 0 0
Soaps	1 10 0
Limestone, cement, clay, &c.	3 0 0

INSTRUCTIONS FOR TAKING AND COLLECTING OF SAMPLES.

SOILS AND SUBSOILS.

To obtain a fair average sample of the soil of a block of land, as near as possible equal quantities of soil are taken from various parts of the fields.

A sketch plan of the field, paddock, or block of land on which the samples were taken should accompany the samples, and the spots where samples are taken are marked on this plan and numbered. This sketch plan should also indicate position of roads, creeks, gullies, ridges, general fall of the land, &c.

Should the soil in various parts of the block show a very marked difference, it will be necessary to divide the block into two, rarely in more, parts. Should the different soil occur only in a small patch, this sample may be left out.

Not less than three samples should be taken in each section. A greater number is to be preferred, as a better average will be obtained.

At the places chosen for the taking of the samples the surface is slightly scraped with a sharp tool, to remove any surface vegetation which has not as yet become part of the soil.

Vertical holes from 10 to 18 inches square are dug in the ground to a depth of 2 feet 6 inches to 3 feet.

The holes are dug out like post-holes; an earth-auger facilitates the operation considerably, and the holes may be trimmed with the spade afterwards.

Careful note of the appearance of the freshly cut soil and subsoil should be taken. The depth of the real soil, which in most cases is easily distinguished, is also measured and noted for each hole. Note how deep the roots of the surface vegetation reach into the soil. If the soil changes gradually into the subsoil, as is the case in some places where the soil is of very great depth, this line of division is guessed approximately, or it is best to take the soil uniformly to a depth of 12 inches.

With a spade a slice of soil is now cut off and put on to a clean bag. The same is done with the subsoil, and the slice is taken from where the soil ends (or 12 inches) to the bottom of the hole, and this subsoil placed on another bag. Stones over the size of a pea may be picked out, the rough quantity of such stones estimated, and a few enclosed with the samples. Fine roots must not be taken out from the soil samples. The same operation is repeated at the other places chosen. Careful note and description in each hole, as numbered and marked on plan given, and the samples of soil collected on the one bag thoroughly mixed by breaking up any large clods, and about 10 lb. of the mixture put into a clean canvas bag, which is securely tied up and labelled. The same is done with the samples of subsoil collected on the other bag.

All the samples collected are afterwards placed into a wooden box.

It is important to use clean bags and clean boxes, and also that the samples should not be left in the neighbourhood of stables or manure heaps. A short description of the land must accompany the samples and the sketch plan.

In the case of cultivated land, state how long the land was under cultivation, what crops were chiefly grown, result of such crops, was any manure applied, when, and what sort, and in what quantities per acre. In the case of virgin soil, state if the land was heavily timbered or not, ringbarked, if scrub or forest land, what sort of timber was chiefly growing on the land. In all cases a description of the neighbouring land, outcropping rocks, &c., are of great value. Also state if the land is naturally or artificially drained or not; describe the land as regards its position to hills, roads, creeks, ridges, &c. Only by adhering strictly to these instructions, and by giving minute details, benefit can be derived from the soil analyses.

WATER.

It is best to collect and forward samples of water for analysis in stoppered glass bottles, generally known as Winchester quarts.

The bottles have to be perfectly clean, and stoppers must fit well. Corks should be avoided, but if used must be new and well washed with the water before being used for closing the bottle.

When taking waters from taps, pumps, bores, the water has to be allowed to run for a while before taking the sample. When taking the water out of a well, pond, or river, the bottle is completely immersed, but care has to be taken not to disturb the mud or sediment at the bottom of the water. Before the sample is actually collected, the bottle is rinsed three times with the water, filling each time about one-third full. The bottle is then filled within about 1 inch from the top; the stopper is inserted and securely tied down with a clean piece of linen or calico.

The stopper must not be fastened or luted with sealing-wax, paste, plaster of paris, &c.

MANURES.

When taking samples of artificial manures out of bags, the sample must be taken from different bags and at different places of the bag and not only from the top, or the bags before being used are emptied on a heap and mixed up well and the sample then taken. About 1 to 2 lb. put into a clean bag should be forwarded for analysis.

FOOD STUFFS.

It is always important to obtain good average samples, and this can only be done by great care in taking the samples from different places, mixing well, and taking a small part of the mixture. This method would apply to any dry foodstuff—as grains of any kind, peas, beans, chaff, pollard, meal, &c. For the analysis of green foods—as green hay, sorghum, silage—it is best to make a mixture of the sample by passing it through a chaffcutter, and by taking an accurately weighed quantity—say 1 lb. This quantity may then be dried in the sun, taking care that nothing is lost, and when dry put in a bag and forwarded for analysis. The green samples may also be forwarded without drying in fruit-preserving jars.

To collect information about value of *green manures*, it is best to plot out exactly one square yard in the field covered with the plant, not picking out a position where the growth is very heavy or poor, but about a fair average. Four pegs are driven into the ground at the four corners, and string stretched between them; with a sharp spade all the plants are cut along the strings, so as to get really the growth of 1 square yard. The plants are all collected and accurately weighed, passed through a chaffcutter, and the sample for analysis taken as above described. In many cases the roots may be also pulled out, weighed separately, and a sample forwarded.

The samples have to be accompanied by a description of the crop—when planted, how old when cut, if the land was manured or not, weight of crop per acre or per square yard, and weight of the sample forwarded when in its green state. In the case of green manures it is generally best to take the samples at the same time when ploughed under, just after flowering.

Chief Secretary's Office,
Brisbane, 20th July, 1900.

THE following Proclamation, issued by His Excellency the Governor of Tasmania in Council, is published for general information.

ROBERT PHILP.

Government Notice.
No. 212.

Agricultural Department,
Hobart, 23rd June, 1900.

The Governor in Council has been pleased to issue the following Proclamation, under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21).

By His Excellency's Command,
GEO. COLLINS, Minister for Agriculture.

"THE VEGETATION DISEASES ACT, 1898."

A Proclamation.

Whereas it is expedient to permit the importation, introduction, or bringing into Tasmania of all citrous trees, cone-bearing trees, ferns, cacti, geraniums, bulbs, and all other plants (excepting fruit trees, cuttings, scions, buds and grafts of fruit trees, the importation of which

is absolutely prohibited), subject to the performance of such conditions as are prescribed by Regulations made under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), bearing even date herewith, or by any Regulations under the said Act which may from time to time be made by me in Council: Now, therefore, I, the Right Honourable Jenico William Joseph, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the colony of Tasmania and its Dependencies, in Council, in pursuance of the provisions of the said Act, do, by this my Proclamation, permit the importation, introduction, or bringing into Tasmania of all citrous trees, cone-bearing trees, ferns, cacti, geraniums, bulbs, and all other plants (excepting fruit trees, cuttings, scions, buds, and grafts of fruit trees, the importation of which is absolutely prohibited), subject to the performance of such conditions as are prescribed by Regulations made under the said Act bearing even date herewith, or by any Regulations under the said Act which may from time to time be made by me, in Council: And I do hereby declare, that unless such conditions prescribed as aforesaid by Regulations made or to be made under the said Act, or any of them, are performed, I do hereby prohibit the importation, introduction, or bringing into Tasmania of the trees and plants so as aforesaid permitted by this my Proclamation to be imported, introduced or brought into Tasmania.

Given under my hand at Hobart, in Tasmania aforesaid, this twenty-second day of June, one thousand nine hundred.

GORMANSTON, Governor.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

Chief Secretary's Office,
Brisbane, 25th July, 1900.

THE following Regulations, made by His Excellency the Governor of Tasmania in Council, under "The Vegetation Diseases Act, 1898," are published for general information.

ROBERT PHILP.

Government Notice.
No. 213.

Agricultural Department,
Hobart, 22nd June, 1900.

The Governor in Council has been pleased to make the following Regulations, under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21).

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

REGULATIONS.

1. Any nursery in which plants are grown for export to Tasmania shall hold a Certificate, signed by the Government Entomologist of the exporting country, that such nursery is free from all pests injurious to fruit trees; and such Certificate shall be forwarded to the Secretary for Agriculture in Tasmania.

2. Such plants as aforesaid shall be inspected by an Inspector of the Department of Agriculture of the said exporting country, duly appointed for that purpose, and, if found to be free from all pests injurious to fruit trees, a Certificate shall be issued to that effect by the said Inspector and forwarded to the Secretary for Agriculture in Tasmania.

3. All citrous trees, cone-bearing trees, ferns, cacti, geraniums, bulbs, or any plant (other than fruit trees, cuttings, scions, buds, and grafts of fruit trees), shall, before shipment to Tasmania, be fumigated with Hydrocyanic Acid Gas in a properly constructed fumigating chamber, for at least one hour, under the supervision of an Inspector duly appointed for that purpose, and a Certificate shall be issued by such Inspector, and forwarded to the Secretary for Agriculture in Tasmania, that such fumigation has been properly carried out.

4. The plants above mentioned shall be unpacked for examination by an Inspector at the port of entry, in a fumigating chamber, and the packing destroyed. If, in the opinion of the Government Entomologist of Tasmania, the plants above mentioned can safely be introduced into Tasmania, such plants shall be fumigated with Hydrocyanic Acid Gas in a properly constructed fumigating chamber, for not less than one hour before delivery, under the supervision of an Inspector duly appointed for that purpose in Tasmania, and a Certificate shall be issued by such Inspector, and forwarded to the Secretary for Agriculture for Tasmania, that such fumigation has been properly carried out.

5. The plants above mentioned shall be landed at the ports of Hobart and Launceston, and at no other port in Tasmania.

6. If any such plants are found to contain any pest the same shall be destroyed forthwith.

7. All costs and charges of inspection, fumigation, and destruction shall be borne by the consignee, provided that if such consignee be an agent only, all costs and charges as aforesaid shall be borne by the person for whom he is acting.

"THE DISEASES IN PLANTS ACT OF 1896."

Department of Agriculture,
Brisbane, 19th January, 1899.

HIS Excellency the Governor, with the advice of the Executive Council, and in pursuance of the provisions of "*The Diseases in Plants Act of* 1896," has been pleased to make the following further Regulations.

J. V. CHATAWAY.

THE FUMIGATION OF FRUIT FOR EXPORT.

1. Any one who wishes to erect a chamber or building for the fumigating of fruit is requested to give notice to the Under Secretary for Agriculture, who will take steps to see that the chamber or building is properly constructed.

2. When it is required to fumigate fruit for export, twenty-four hours' notice must be given to the said Under Secretary or such other officer as may be duly authorised to accept such notice.

3. The operation of fumigating must be conducted under the control of an officer authorised by the Minister for Agriculture.

4. The fumigating chamber may be made of any convenient size or material, the essential point being that it shall be capable of being closed absolutely airtight, and provided with a flue-pipe in the roof which can be opened or closed to allow of the escape of the gas after fumigation. The flue must be provided with a box or chamber to contain caustic soda or potash to destroy the gas.

The fumigating chamber must be provided with a shutter or sliding panel in the lower portion of the door or wall.

Door, flue, and shutter must all be made to close absolutely airtight.

Directions for Fumigating with Hydrocyanic Acid Gas.

Proportions of Ingredients.—For every 150 cubic feet of room take 1 ounce of cyanide of potassium, 5 fluid ounces sulphuric acid, 10 fluid ounces water.

Having placed the fruit to be fumigated in the chamber, see that the flue and the shutter in the door or lower part of all are properly closed.

The acid is then to be diluted in the following manner:—The whole of the water is placed in a shallow china or glazed earthenware vessel, such as an ordinary wash-hand basin. (Metal vessels are inadvisable unless they are leaden ones.) The sulphuric acid is next poured on to the water in a thin stream, stirring the while with a stick. Do not mix by adding the water to the acid.

The basin containing the acid thus diluted (which should be allowed to cool) is now placed in the fumigating chamber, and the cyanide of potassium is emptied into it.

The gas is given off with great violence, and the door should be immediately closed.

The whole is now to be left to itself for one hour. At the end of this time the shutters in the flue and in the door are opened, and the draught produced drives the gas out of the chamber. At the end of half an hour the door is thrown open, and if the draught has been effective there should be hardly any trace of hydrocyanic gas recognisable. The chamber may be left in this condition for another ten minutes or a quarter of an hour. The fruit is now to be moved and allowed to remain in a well ventilated place, preferably out of doors, for another half an hour. Samples of fruit will be examined from time to time by the entomologist.

Caution.—As hydrocyanic acid gas is most deadly in its effects on animal life, the greatest care must be taken in its use.

Department of Agriculture,
Brisbane, , 18 .

This is to certify that has treated cases of citrus fruit with hydrocyanic acid gas for one hour, under my supervision. These cases have been branded "Crown" over "Passed."

Shipping marks:
Per S.S.:
Consigned to:

Department of Agriculture,
Brisbane, 26th January, 1899.

THE following Proclamation by His Excellency the Governor of New South Wales is published for general information.

J. V. CHATAWAY.

New South Wales, to wit. (L.S.) Hampden, *Governor.*

Proclamation.

By His Excellency The Right Honourable Henry Robert, Viscount Hampden, Governor and Commander-in-Chief of the Colony of New South Wales and its Dependencies.

Whereas the Governor is empowered by Section 9 of the "Vegetation Diseases Act, 1897," from time to time, by Proclamation in the *Gazette*, to declare any fungus or vegetable parasite whatever to be a fungus within the meaning of the said Act: Now, therefore, I, Henry Robert Viscount Hampden, the Governor aforesaid, with the advice of the Executive Council, do, by this my Proclamation, declare Black Spot (*Fusicladium*) to be a fungus within the meaning of the said Act.

Given under my Hand and Seal, at Government House, Sydney, this twenty-second day of December, in the year of our Lord one thousand eight hundred and ninety-eight, and in the sixty-second year of Her Majesty's reign.

By His Excellency's Command,

JOSEPH COOK.

God Save the Queen!

Department of Agriculture,
Brisbane, 25th May, 1899.

HIS Excellency the Governor, with the advice of the Executive Council, has, in pursuance of the provisions of "*The Slaughtering Act of* 1898," been pleased to make the following Regulations.

J. V. CHATAWAY.

REGULATIONS UNDER "THE SLAUGHTERING ACT OF 1898."

Definitions.

1. Save as herein otherwise provided, in these Regulations the terms used have the meanings respectively assigned to them by "*The Slaughtering Act of* 1898."

The term "Stock" means and includes cattle, sheep, and swine;

The term "Licensing Court" means a Police Magistrate or if he is absent or there is no Police Magistrate, then any two justices sitting in a Court of Petty Sessions having jurisdiction in the district within which a slaughter-house is or is proposed to be established;

The term "Inspector" means the inspector (if any) to whom a district is assigned, or if he is absent, or there is no such inspector then any inspector appointed under the provisions of "*The Slaughtering Act of* 1898";

The term "Owner of stock" means the owner whether jointly or severally of the stock, or the authorised agent or superintendent of the owner, or the drover or person in charge of the stock.

Unlicensed slaughter-house.

2. Any person who establishes or keeps an unlicensed slaughter-house is guilty of an offence against these Regulations.

Illegal slaughter.

3. No person shall slaughter at any place other than at a licensed slaughter-house any stock the flesh of which is intended to be used for meat.

Licensing Court.

4. Subject to these Regulations, the Licensing Court may license slaughter-houses established or proposed to be established within a district.

Application.

5. Every person who desires to obtain a license or the renewal of a license for a slaughter-house shall make an application therefor in writing in the form in the First Schedule hereto or to the like effect.

Time for applying.

6. Every application shall be addressed to the Licensing Court of the district within which the slaughter-house is or is proposed to be established, shall be lodged with the proper Clerk of Petty Sessions, and shall be accompanied by the license fee hereinafter prescribed. Applications for licenses shall be so lodged on or before the fourteenth day of December, March, June, and September in each year. Applications for the renewal of licenses shall be so lodged on or before the fourteenth day of December in each year.

Duty of clerk of petty sessions.

7. Upon the receipt of every such application, the clerk of petty sessions shall forthwith forward a copy of the same to the local authority of the district and also to the inspector.

Representatives of local authority.

8. The local authority of the district may make to the Licensing Court such representations, in writing or otherwise, with respect to every such application, as the local authority thinks fit.

Report of inspector.

9. It shall be the duty of the inspector, upon the receipt of every such copy of an application, to inspect the premises in respect of which a license or the renewal of a license is applied for, and to report thereon to the Licensing Court. He shall either make such report in writing under his hand, or, if directed so to do by the chief inspector, shall personally attend at the sittings of the Licensing Court, and there orally report to the Court upon the same.

The hearing.

10. The Licensing Court shall sit for the hearing and determination of all applications for licenses on the first Tuesday in the months of January, April, July, and October in every year.

The Licensing Court shall sit for the hearing and determination of all applications for the renewal of licenses on the first Tuesday in the month of January in every year.

After considering the report of the inspector and the representations, if any, of the local authority of the district, the Court may, subject to these Regulations—

(1) Grant the application; or
(2) Adjourn the application for the purpose of the execution by the applicant of such works as in the opinion of the Licensing Court are necessary to render the premises suitable and proper for the slaughter of stock; or
(3) Refuse the application.

Duration of license.

11. Save as hereinafter provided, a license for a slaughter-house shall remain in force for the period of one year, but may from time to time be renewed for a like period. Provided that a new license granted for a slaughter-house shall only remain in force until the sitting of the Licensing Court held in the month of January following the date on which such license was granted. Provided further that all existing licenses shall remain in force until the sitting of the Licensing Court held in the month of January next.

Fees for licenses.

12. The annual fee payable in respect of the license or the renewal of the license of a slaughter-house shall be twenty shillings.

Fees for defraying expenses.

13. The fees payable by the licensee of a slaughter-house for the purpose of defraying the expenses of inspection shall be as follows, that is to say:—

	s.	d.
For every bullock, steer, cow, or heifer slaughtered ...	0	3
For every 12 sheep or calves slaughtered	0	3
For every head of swine slaughtered	0	3

Such fees shall be paid by the licensee to the inspector monthly, or at such shorter intervals as the inspector may require.

Receipt.

14. The inspector shall, upon the payment of such fees, give to the licensee a receipt under his hand in the form of the Second Schedule hereto.

Delivery note.

15. When stock are delivered at a slaughter-house to be slaughtered, the owner of the stock shall deliver to the owner of the slaughter-house a way bill or delivery note of the stock, setting forth the number, the description, and the brands or marks of the stock, and signed by the owner thereof.

The owner of the slaughter-house shall retain and preserve every such way bill or delivery note, and shall, on demand, produce the same to the inspector.

Slaughtering book.

16. The licensee of every slaughter-house shall keep a book called a "Slaughtering Book," in which shall be correctly recorded all the particulars set out in the Third Schedule hereto; and such book shall be open at all reasonable times to the inspection of any inspector, or any inspector of brands or police officer, who may make any copy of or extract therefrom.

Floors.

17. The floor of every place in a slaughter-house where stock are pithed or slaughtered, or where meat is dressed, prepared, treated, or stored, shall, if required by the inspector, be constructed of concrete or otherwise rendered impervious, to his satisfaction.

Drainage; ventilation.

18. Every slaughter-house shall be drained and ventilated to the satisfaction of the Inspector.

Blood.

19. In every slaughter-house all blood shall be boiled, desiccated, or otherwise treated to the satisfaction of the Inspector.

Privies.

20. Every water-closet, privy, cesspool, and urinal used in connection with a slaughter-house shall be situated at a distance of not less than one hundred yards from any building, enclosure, or place in or at which stock are slaughtered or meat is dressed prepared, treated, or stored.

Pigsties.

21. Every pigsty, enclosure, and place where swine are kept at a slaughter-house shall be situated at a distance of not less than two hundred and fifty yards from any building, enclosure, or place in or at which stock are slaughtered or meat is dressed, prepared, treated, or stored.

Offal to swine.

22. Swine shall not be fed with offal at a slaughter-house, nor shall any offal be removed therefrom for the purpose of feeding swine, unless such offal has first been thoroughly cooked.

Notice of slaughtering.

23. The owner of every slaughter-house shall give to the inspector such notice of his intention to slaughter stock as will enable the inspector to inspect such stock.

Tampering with meat.

24. Until stock slaughtered have been inspected by the inspector the pleuræ are not to be stripped or otherwise interfered with, and no part of the carcass is to be cut away, manipulated, or interfered with in any manner which may prevent the discovery of disease or may alter the true condition of the meat.

The inspector may condemn any stock or meat which in his opinion has been dealt with in contravention of the provisions of this Regulation.

Branding meat.

25. When the inspector has inspected any meat and approved of the same, he shall brand each separate quarter of beef and each carcass or quarter of mutton with a mark or stamp.

Any person who wilfully removes or obliterates any such mark or stamp, or who, not being an inspector, affixes or causes to be affixed to any meat any such mark or stamp, is guilty of an offence against these Regulations.

Calves.

26. Calves less than four weeks old are not to be slaughtered for meat.

Condemned meat.

27. Condemned meat at a slaughter-house shall be rendered unfit for the food of man in the mode directed by the inspector.

Removal of hides, &c.

28. Offal and the hides, skins, heads, and feet of stock slaughtered at a slaughter-house shall only be removed from the premises in the manner and at the times directed by the inspector.

The contents of paunches and of intestines shall be deposited in the place appointed by the inspector for the purpose.

Carriage of meat.

29. Meat shall be carried from the slaughter-house to the butcher's shop in vehicles approved by the inspector.

Every such vehicle shall be provided with a proper roof, and shall be so constructed as to permit of a free current of air.

Meat shall be carried in such vehicle either suspended from the roof or sides thereof, or so arranged that a free current of air may circulate between the carcasses or portions of carcasses being carried.

Blowing meat, &c.

30. No person shall blow with his breath or otherwise into any meat, or eject any salt, liquid matter, or other substance from his mouth thereon.

No person shall treat, dress, or prepare any meat by means of any preservative or other substance which, in the opinion of the inspector, injures, or is likely to injure, such meat or to render it unfit for the food of man.

Offences.

31. Any person who contravenes any of the provisions of these Regulations is guilty of an offence, and is liable to a penalty not exceeding fifty pounds.

When a licensee of a slaughter-house, having been convicted of an offence against "*The Slaughtering Act of* 1898" or these Regulations, is on a second or subsequent occasion convicted of an offence against such Act or Regulations, the Court, by or before whom he is so convicted as last aforesaid, may, in addition to the punishment for such offence, order the license of the slaughter-house to be suspended for such time as the Court thinks fit, or to be absolutely cancelled, and such license shall be so suspended or cancelled accordingly.

FIRST SCHEDULE.

APPLICATION FOR A LICENSE OR THE RENEWAL OF A LICENSE OF A SLAUGHTER-HOUSE.

"*The Slaughtering Act of* 1898."

To the Licensing Court for the District of [*name of District*].

I [*or* we] hereby apply to the Licensing Court to be holden for the district of [*name of district*] for a license [*or* the renewal of a license] of a slaughter-house proposed to be established [*or* established] at [*describe locality so as to clearly identify it*].

Dated at the day of

Applicant.

SECOND SCHEDULE.

RECEIPT.

"*The Slaughtering Act of* 1898."

I have this day received from [*name of licensee or licensees*] the sum of £ , being fees in respect of stock slaughtered at the slaughter-house at [*situation of slaughter-house*], whereof he is the licensee [*or* they are the licensees], between the day of and the day of .

The particulars of the stock are as follow :—

Cattle [*insert number*]
Sheep and Calves [*insert number*]
Swine [*insert number*]

Dated at the day of

Inspector.

THIRD SCHEDULE.

SLAUGHTERING BOOK.

Date of Slaughtering.	Number of Stock Slaughtered.			Person from whom Stock obtained.	Brands or Marks.
	Cattle.	Sheep.	Swine.		

REGULATIONS UNDER "THE SLAUGHTERING ACT OF 1898."

Department of Agriculture,
Brisbane, 15th November, 1899.

HIS Excellency the Lieutenant-Governor, with the advice of the Executive Council, has, in pursuance of the provisions of "*The Slaughtering Act of* 1898," been pleased to make the following additional Regulation.

J. V. CHATAWAY.

32. Clause 12 of the Regulations under "*The Slaughtering Act of* 1898," dated the twenty-fifth day of May, 1899, and published in the *Government Gazette* dated the twenty-seventh day of May, 1899, is amended by the addition of the following paragraph :—

Provided that the annual fee payable in respect of such license or renewal of such license issued to persons who only slaughter calves and pigs, but not exceeding five head in all in any week, shall be two shillings and sixpence.

By Authority: EDMUND GREGORY, Government Printer, William street, Brisbane.

Public Announcements.

The Editor will be glad to receive any papers of special merit which may be read at meetings of Agricultural and Pastoral Associations in Queensland, reserving, however, the right to decide whether their value and importance will justify their publication.

The *Queensland Agricultural Journal* will be supplied to all members of Agricultural and Horticultural Societies who do not derive their livelihood solely from the land, on payment, in advance, of an annual subscription of 5s.

ADVERTISEMENTS.

Advertisements which relate wholly to the sale of Agricultural Machinery, Seeds, Plants, Manures, Farm Stock, Feeding Stuff, &c., will be inserted in the *Journal* at the following rates :—

	£	s.	d.
Full page, per issue	4	0	0
Half page, per issue	2	10	0
Quarter page, per issue	1	10	0

On advertisements standing for six months a discount of 15 per cent. will be allowed, and 25 per cent. on those inserted for twelve months.

SISAL HEMP PLANTS.

The Department of Agriculture having a quantity of sisal hemp plants and seedlings for gratuitous distribution, intending planters are requested to make early application for the same to the Under Secretary for Agriculture.

LIST OF AGRICULTURAL, HORTICULTURAL, AND PASTORAL SOCIETIES AND ASSOCIATIONS IN QUEENSLAND.

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Allora ...	Central Downs Agricultural and Horticultural Association	J. H. Buxton... ...	Feb.
Ayr	Lower Burdekin Farmers' Association ...	Winsor H. Wilmington	
Beaudesert ...	Logan and Albert Pastoral and Agricultural Society	M. Hinchcliffe ...	11 May
Beenleigh ...	Agricultural and Pastoral Society of Southern Queensland	Wilson Holliday ...	7 Sept.
Biggenden ...	Biggenden Agricultural and Pastoral Society	Charles H. Peppin ...	14 June
Birthamba ...	South Kolan Agricultural and General Progress Association	G. W. Nixon ...	
Blackall ...	Barcoo Pastoral Society	F. Clewett	
Boonah ...	Fassifern and Dugandan Agricultural and Pastoral Association	J. A. McBean ...	14 and 15 June
Bowen ...	Pastoral, Agricultural, and Mining Association	J. E. Smith	9 Aug.
Bowen ...	Proserpine Farmers and Settlers' Association	Joseph Cooper ...	
Booyal ...	Booyal Farmers' Progress Association ...	Thos. Skillington ...	
Brisbane ...	Horticultural Society of Queensland	J. F. Bailey	9 Oct.
Brisbane ...	Queensland Acclimatisation Society	E. Grimley	
Brisbane ...	National Agricultural and Industrial Association of Queensland	H. C. Wood	
Brisbane ...	Queensland Stockbreeders and Graziers' Association	F. A. Blackman ..	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Brisbane ...	United Pastoralists' Association	Fredk. Ranson ...	
Bundaberg ...	Bundaberg Horticultural and Industrial Society	H. E. Ashley ...	
Bundaberg ...	Council of Agriculture	Jos. Campbell ...	
Bundaberg ...	Woongarra Canegrowers and Farmers' Association	W. H. Dart	
Burpengary...	Burpengary Farmers' Association	C. H. Ham	
Byrnestown...	Byrnestown Farmers' Progress Association ...	J. Dufficy	
Caboolture ...	Caboolture Farmers' Association	G. Mallet	
Cairns ...	Aloombah Farmers' Association	Chas. R. Spencer ...	
Cairns ...	Cairns Agricultural, Pastoral, and Mining Association	A. J. Draper... ...	5 and 6 Sept.
Cairns ...	Cairns District Coffee-growers' Association ...	W. A. Hannam ...	
Cairns ...	Cairns District United Farmers' Association	Wm. Griffin ...	
Cairns ...	Hambledon Planters' Association	A. M. Stephens ...	
Charleville ..	Central Warrego Pastoral and Agricultural Association	E. F. C. Manning ...	25 and 26 May
Charters Towers	Towers Pastoral, Agricultural, and Mining Association	W. Tilley	30 and 31 May; 1 June
Childers ...	Isis Agricultural Association	H. Epps	
Childers ...	Doolbi Mill Branch, Isis Agricultural Association	W. T. H. Job ...	
Childers ...	Childers Mill Branch, Isis Agricultural Association	H. Epps	
Clermont ...	Peak Downs Pastoral, Horticultural, and Agricultural Society	F. Leysley	
Clermont ...	Peak Downs Dairymen and Settlers' Association	A. G. Pursell ...	
Cooktown ...	Cook District Pastoral and Agricultural Society	W. R. Humphreys ...	
Cooran ...	Cooran Progress and Agricultural Association	Thos. Smith	
Cordalba ...	Cordalba Farmers' Association	B. Goodliffe	
Currajong ...	Currajong Farmers' Progress Association ...	Wm. Howard ...	
Cunnamulla	South Warrego Pastoral Association	J. Winward	
Dalby ...	Northern Downs Pastoral and Agricultural Association	W. M. Alexander ...	July
Dallarnil Scrub, *viâ* Degilbo	Dallarnil Farmers' Association	W. E. Burton ...	
Deception Bay	Deception Bay Farmers' Association	B. J. T. Liscombe ...	
Degilbo ...	Degilbo District Farmers' Association ...	J. Harvey	27 and 28 Dec., 1900
Gayndah ...	Gayndah Agricultural and Horticultural Association	J. C. Kerr	
Gladstone ...	Gladstone Pastoral and Agricultural Association	W. J. Manning ...	
Gooburrum, Bundaberg	Gooburrum Farmers and Canegrowers' Association	W. J. Tutin	
Goondiwindi	MacIntyre River Pastoral and Agricultural Society	A. Warden	
Gympie ...	Agricultural, Mining, and Pastoral Society	F. Vaughan	13 and 14 Sept.
Gympie ...	Chatsworth Farmers' Progress Association ...	William Bellman ...	
Gympie ...	Deep Creek Farmers' Progress Association ...	W. Reid	
Gympie ...	Gympie Horticultural Society	Charles Brasch ...	19 and 20 April
Gympie ...	The Pie and Eel Creek Farmers' Association	Wm. H. Ryan ...	
Gympie ...	Gympie Central Farmers and Progress Association	J. Howard Maynard	
Haslemore, Victoria, Herbert Riv.	Herbert River Farmers' League ...	Alfred Henry ...	
Helidon ...	Helidon Scrub Farmers' Progress Association	Jas. Tysoe	
Herbert River	Halifax Planters' Club	H. G. Faithful ...	
Herbert River	Macnade Farmers' Association...	Edwin S. Waller ...	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Herbert River	Ripple Creek Farmers' Association	J. W. Grimes	
Herberton ...	Mining, Pastoral, and Agricultural Association	John M. Hollway	3 and 4 April
Hodgson ...	Hodgson Farmers' Association	C.W. Nimmo	
Hughenden ...	Hughenden Pastoral and Agricultural Association	H. P. Blackall	7 and 8 May
Ingham ...	Herbert River Farmers' Association	...	
Ingham ...	Herbert River Pastoral and Agricultural Association (Agricultural Show)	P. J. Cochrane	Sept.
Ipswich ...	Ipswich and West Moreton Agricultural and Horticultural Society	P. W. Cameron	27 Sept.
Ipswich ...	Queensland Pastoral and Agricultural Society	Elias Harding	11 and 12 July
Kandanga (near Gympie)	Kandanga Farmers' Association	N. Rasmussen	
Kolan ...	Kolan Canegrowers and Farmers' Association	C. Marks ...	
Ladeside ...	Mungore Farmers' Association	I. M. Robinson	
Laidley ...	Lockyer Agricultural and Industrial Society (Ploughing Match, Laidley)	John Fielding	11 Oct.
Loganholme ...	Logan Farming and Industrial Association ...	F. W. Peek ...	
Longreach ...	Longreach Pastoral and Agricultural Society	J. P. Peterson	17 and 18 April
Lucinda Point	Victoria Farmers' Association	W. S. C. Warren	
Mackay ...	Agricultural, Pastoral, and Mining Association	F. Black	
Mackay ...	Pioneer River Farmers' Association	E. Swayne	28 and 29 June
Mackay ...	The Mackay and District Horticultural Society	Fred. Bourne	
Mapleton, *viâ* Nambour	Mapleton and Dulong Fruitgrowers and Farmers' Progress Association	W. J. Smith ...	
Maryborough	Maryborough Horticultural Society	H. A. Jones ...	
Maryborough	The Island Farmers' Progress Association ...	C. A. Schmidt	
Maryborough	Wide Bay and Burnett Pastoral and Agricultural Society	G. Willey ...	4, 5, and 6 July
Miallo ...	Miallo Progress Association	E. F. Welchman	
Miara, Yandaran	Avondale Farmers and Planters' Association	F. E. Eggar ...	
Milbong ...	Milbong Farmers' Association	T. R. Garrick	
Mitchell ...	Mitchell and Maranoa Pastoral, Agricultural, and Vinegrowers' Association	H. J. Corbett	
Mosman River	Mosman River Farmers' Association	Geo. W. Muntz	
Mount Cotton	Mount Cotton and Tingalpa Division Fruitgrowers and Farmers' Association	F. N. Sharman	
Mount Mee ...	Mount Mee Farmers' Association	R. Thomas ...	
Mount Morgan	Mount Morgan Agricultural, Pastoral, and Poultry Society	Thos. W. Walker	
Nerang ...	South Queensland and Border Pastoral and Agricultural Society	W. J. Browne	5 Oct.
North Isis ...	North Isis Canegrowers' Association	W. J. Young	
North Pine ...	Moreton Agricultural, Horticultural, and Industrial Association	J. Duffield ..	
Pialba ...	Pialba Farmers' Association	J. B. Stephens	
Pinbarren ...	Pinbarren Agricultural and Progress Association	H. Armitage, senr.	
Port Douglas	Pastoral, Agricultural, and Mining Association	W. H. Dorrat	2 Aug.
Razorback ...	The Razorback Fruitgrowers' Association ...	Robert Tinning ...	
Rockhampton	Central Queensland Farmers and Selectors' Association	T. Whitely, Coowonga	
Rockhampton	Central Queensland Stockowners' Association	R. R. Dawbarn	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Rockhampton	Rockhampton Agricultural Society	R. R. Dawbarn ...	29 and 30 May
Roma ...	Western Pastoral and Agricultural Association of Queensland	Angus McPherson ...	
Roma ...	Yingerbay Farmers' Association	Alex. C. McIntyre ...	
Rosewood ...	Farmers' Club	P. H. Adams... ...	4 Oct.
Southport ...	Southport Horticultural Society	E. Fass	19 April
Springsure ...	Queensland Pastoral Society	G. R. Milliken ...	
Stanthorpe ...	Border Pastoral, Agricultural, and Mining Society	Geo. Simcocks ...	22 and 23 Feb.
Stanthorpe ...	Stanthorpe Horticultural and Viticultural Society	R. Hoggan	
Stanwell ...	The Stanwell Agricultural Society	A. Spanner	
St. George ...	Balonne Pastoral and Agricultural Association	T. M. Cummings ...	
Tinana ...	Tinana Fruitgrowers and Farmers' Association	Chas. Parke	
Toowoomba...	Darling Downs Horticultural Association ...	H. Hopkins	
Toowoomba...	Drayton and Toowoomba Agricultural and Horticultural Society	H. Symes	
Toowoomba...	Royal Agricultural Society of Queensland ...	F. Burtt	31 July; 1 and 2 Aug.
Townsville ...	Townsville Pastoral, Agricultural, and Industrial Association (formerly North Queensland Pastoral and Agricultural Association)	J. N. Parkes	6 and 7 June
Upper North Pine	Upper North Pine Farmers' Association ...	J. Skerman	
Wallumbilla	Wallumbilla Selectors' League	George Dalziel ..	
Warwick ...	Eastern Downs Horticultural and Agricultural Association	J. Selke	31 Jan. & 1 Feb.
Wellington Point	Wellington Point Agricultural, Horticultural, and Industrial Association	F. W. Wort	13 June
Woombye ...	Woombye Fruitgrowers' Association	P. S. Hungerford ...	
Woowoonga	Woowoonga Scrub Farmers' Association ...	G. T. Worth	
Zillmere ...	Zillmere Horticultural Society	C. M. F. Fischer ...	20 Jan.

GOVERNMENT AGRICULTURAL LABORATORY.

INSTRUCTION FOR THE COLLECTION OF SAMPLES, AND SCALE OF FEES.

GENERAL INSTRUCTIONS.

1. All analyses are carried out in their turn as they arrive at the Laboratory.

2. Should a customer wish for an immediate analysis, the fee, as provided by scale of fees below, will be increased by 50 per cent.

3. The samples may be forwarded by parcel post or by rail, either to the Under Secretary for Agriculture, Brisbane, or direct to the Chemist, Agricultural Laboratory, at the Agricultural College, Gatton; but in any case the required fee must be transmitted at the same time.

4. Analyses will be only carried out, if samples are taken strictly in accordance with the instructions issued below.

SCALE OF FEES.

	Farmers, Selectors, Gardeners. £ s. d.
Soil—Short analysis (estimation of lime, alkalies, nitrogen, and phosphoric acid) ...	2 2 0
Soil and subsoil—Short analysis ...	3 3 0
Soil—Complete analysis ...	4 4 0
Water—Analysis ...	3 3 0
Manures—	
Complete analysis ...	2 2 0
Nitrogen only ...	0 7 6
Potash only ...	0 7 6
Phosphoric acid sol. ...	0 15 0
Phosphoric acid insol. ...	0 15 0

SCALE OF FEES—*continued.*

	Farmers, Selectors, Gardeners. £ s. d
Food Stuffs—	
Complete analysis	2 2 0
Water only	0 5 0
Albuminoids	0 10 0
Oil or fat	0 7 6
Ash	0 5 0
Fibre	0 7 6
Sugar-cane, sugar-beet, megass—Analysis of	1 1 0
Sugar, massecuite, jelly, molasses	1 1 0
Milk, butter, cheese—Complete analysis	1 0 0
Tanning materials (tannin estim.)	1 0 0
Soaps	1 10 0
Limestone, cement, clay, &c.	3 0 0

INSTRUCTIONS FOR TAKING AND COLLECTING OF SAMPLES.

SOILS AND SUBSOILS.

To obtain a fair average sample of the soil of a block of land, as near as possible equal quantities of soil are taken from various parts of the fields.

A sketch plan of the field, paddock, or block of land on which the samples were taken should accompany the samples, and the spots where samples are taken are marked on this plan and numbered. This sketch plan should also indicate position of roads, creeks, gullies, ridges, general fall of the land, &c.

Should the soil in various parts of the block show a very marked difference, it will be necessary to divide the block into two, rarely in more, parts. Should the different soil occur only in a small patch, this sample may be left out.

Not less than three samples should be taken in each section. A greater number is to be preferred, as a better average will be obtained.

At the places chosen for the taking of the samples the surface is slightly scraped with a sharp tool, to remove any surface vegetation which has not as yet become part of the soil.

Vertical holes from 10 to 18 inches square are dug in the ground to a depth of 2 feet 6 inches to 3 feet.

The holes are dug out like post-holes; an earth-auger facilitates the operation considerably, and the holes may be trimmed with the spade afterwards.

Careful note of the appearance of the freshly cut soil and subsoil should be taken. The depth of the real soil, which in most cases is easily distinguished, is also measured and noted for each hole. Note how deep the roots of the surface vegetation reach into the soil. If the soil changes gradually into the subsoil, as is the case in some places where the soil is of very great depth, this line of division is guessed approximately, or it is best to take the soil uniformly to a depth of 12 inches.

With a spade a slice of soil is now cut off and put on to a clean bag. The same is done with the subsoil, and the slice is taken from where the soil ends (or 12 inches) to the bottom of the hole, and this subsoil placed on another bag. Stones over the size of a pea may be picked out, the rough quantity of such stones estimated, and a few enclosed with the samples. Fine roots must not be taken out from the soil samples. The same operation is repeated at the other places chosen. Careful note and description in each hole, as numbered and marked on plan given, and the samples of soil collected on the one bag thoroughly mixed by breaking up any large clods, and about 10 lb. of the mixture put into a clean canvas bag, which is securely tied up and labelled. The same is done with the samples of subsoil collected on the other bag.

All the samples collected are afterwards placed into a wooden box.

It is important to use clean bags and clean boxes, and also that the samples should not be left in the neighbourhood of stables or manure heaps. A short description of the land must accompany the samples and the sketch plan.

In the case of cultivated land, state how long the land was under cultivation, what crops were chiefly grown, result of such crops, was any manure applied, when, and what sort, and in what quantities per acre. In the case of virgin soil, state if the land was heavily timbered or not, ringbarked, if scrub or forest land, what sort of timber was chiefly growing on the land. In all cases a description of the neighbouring land, outcropping rocks, &c., are of great value. Also state if the land is naturally or artificially drained or not; describe the land as regards its position to hills, roads, creeks, ridges, &c. Only by adhering strictly to these instructions, and by giving minute details, benefit can be derived from the soil analyses.

WATER.

It is best to collect and forward samples of water for analysis in stoppered glass bottles, generally known as Winchester quarts.

The bottles have to be perfectly clean, and stoppers must fit well. Corks should be avoided, but if used must be new and well washed with the water before being used for closing the bottle.

When taking waters from taps, pumps, bores, the water has to be allowed to run for a while before taking the sample. When taking the water out of a well, pond, or river, the bottle is completely immersed, but care has to be taken not to disturb the mud or sediment at the bottom of the water. Before the sample is actually collected, the bottle is rinsed three times with the water, filling each time about one-third full. The bottle is then filled within about 1 inch from the top; the stopper is inserted and securely tied down with a clean piece of linen or calico.

The stopper must not be fastened or luted with sealing-wax, paste, plaster of paris, &c.

MANURES.

When taking samples of artificial manures out of bags, the sample must be taken from different bags and at different places of the bag and not only from the top, or the bags before being used are emptied on a heap and mixed up well and the sample then taken. About 1 to 2 lb. put into a clean bag should be forwarded for analysis.

FOOD STUFFS.

It is always important to obtain good average samples, and this can only be done by great care in taking the samples from different places, mixing well, and taking a small part of the mixture. This method would apply to any dry foodstuff—as grains of any kind, peas, beans, chaff, pollard, meal, &c. For the analysis of green foods—as green hay, sorghum, silage—it is best to make a mixture of the sample by passing it through a chaffcutter, and by taking an accurately weighed quantity—say 1 lb. This quantity may then be dried in the sun, taking care that nothing is lost, and when dry put in a bag and forwarded for analysis. The green samples may also be forwarded without drying in fruit-preserving jars.

To collect information about value of *green manures*, it is best to plot out exactly one square yard in the field covered with the plant, not picking out a position where the growth is very heavy or poor, but about a fair average. Four pegs are driven into the ground at the four corners, and string stretched between them; with a sharp spade all the plants are cut along the strings, so as to get really the growth of 1 square yard. The plants are all collected and accurately weighed, passed through a chaffcutter, and the sample for analysis taken as above described. In many cases the roots may be also pulled out, weighed separately, and a sample forwarded.

The samples have to be accompanied by a description of the crop—when planted, how old when cut, if the land was manured or not, weight of crop per acre or per square yard, and weight of the sample forwarded when in its green state. In the case of green manures it is generally best to take the samples at the same time when ploughed under, just after flowering.

Chief Secretary's Office,
Brisbane, 20th July, 1900.

THE following Proclamation, issued by His Excellency the Governor of Tasmania in Council, is published for general information.

ROBERT PHILP.

Government Notice.

No. 212.

Agricultural Department,
Hobart, 23rd June, 1900.

The Governor in Council has been pleased to issue the following Proclamation, under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21).

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

"THE VEGETATION DISEASES ACT, 1898."

A Proclamation.

Whereas it is expedient to permit the importation, introduction, or bringing into Tasmania of all citrous trees, cone-bearing trees, ferns, cacti, geraniums, bulbs, and all other plants (excepting fruit trees, cuttings, scions, buds and grafts of fruit trees, the importation of which

is absolutely prohibited), subject to the performance of such conditions as are prescribed by Regulations made under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), bearing even date herewith, or by any Regulations under the said Act which may from time to time be made by me in Council: Now, therefore, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the colony of Tasmania and its Dependencies, in Council, in pursuance of the provisions of the said Act, do, by this my Proclamation, permit the importation, introduction, or bringing into Tasmania of all citrous trees, cone-bearing trees, ferns, cacti, geraniums, bulbs, and all other plants (excepting fruit trees, cuttings, scions, buds, and grafts of fruit trees, the importation of which is absolutely prohibited), subject to the performance of such conditions as are prescribed by Regulations made under the said Act bearing even date herewith, or by any Regulations under the said Act which may from time to time be made by me, in Council: And I do hereby declare, that unless such conditions prescribed as aforesaid by Regulations made or to be made under the said Act, or any of them, are performed, I do hereby prohibit the importation, introduction, or bringing into Tasmania of the trees and plants so as aforesaid permitted by this my Proclamation to be imported, introduced or brought into Tasmania.

Given under my hand at Hobart, in Tasmania aforesaid, this twenty-second day of June, one thousand nine hundred.

GORMANSTON, Governor.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

Chief Secretary's Office,
Brisbane, 25th July, 1900.

THE following Regulations, made by His Excellency the Governor of Tasmania in Council, under "The Vegetation Diseases Act, 1898," are published for general information.

ROBERT PHILP.

GOVERNMENT NOTICE.
No. 213.

Agricultural Department,
Hobart, 22nd June, 1900.

THE Governor in Council has been pleased to make the following Regulations, under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21).

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

REGULATIONS.

1. Any nursery in which plants are grown for export to Tasmania shall hold a Certificate, signed by the Government Entomologist of the exporting country, that such nursery is free from all pests injurious to fruit trees; and such Certificate shall be forwarded to the Secretary for Agriculture in Tasmania.

2. Such plants as aforesaid shall be inspected by an Inspector of the Department of Agriculture of the said exporting country, duly appointed for that purpose, and, if found to be free from all pests injurious to fruit trees, a Certificate shall be issued to that effect by the said Inspector and forwarded to the Secretary for Agriculture in Tasmania.

3. All citrous trees, cone-bearing trees, ferns, cacti, geraniums, bulbs, or any plant (other than fruit trees, cuttings, scions, buds, and grafts of fruit trees), shall, before shipment to Tasmania, be fumigated with Hydrocyanic Acid Gas in a properly constructed fumigating chamber, for at least one hour, under the supervision of an Inspector duly appointed for that purpose, and a Certificate shall be issued by such Inspector, and forwarded to the Secretary for Agriculture in Tasmania, that such fumigation has been properly carried out.

4. The plants above mentioned shall be unpacked for examination by an Inspector at the port of entry, in a fumigating chamber, and the packing destroyed. If, in the opinion of the Government Entomologist of Tasmania, the plants above mentioned can safely be introduced into Tasmania, such plants shall be fumigated with Hydrocyanic Acid Gas in a properly constructed fumigating chamber, for not less than one hour before delivery, under the supervision of an Inspector duly appointed for that purpose in Tasmania, and a Certificate shall be issued by such Inspector, and forwarded to the Secretary for Agriculture for Tasmania, that such fumigation has been properly carried out.

5. The plants above mentioned shall be landed at the ports of Hobart and Launceston, and at no other port in Tasmania.

6. If any such plants are found to contain any pest the same shall be destroyed forthwith.

7. All costs and charges of inspection, fumigation, and destruction shall be borne by the consignee, provided that if such consignee be an agent only, all costs and charges as aforesaid shall be borne by the person for whom he is acting.

Chief Secretary's Office,
Brisbane, 4th September, 1900.

THE following Proclamations and Regulations, issued by His Excellency the Governor of Tasmania in Council, are published for general information.

JAMES R. DICKSON.

GOVERNMENT NOTICE.
No. 256.

Agricultural Department,
Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to issue the following Proclamation under "The Vegetation Diseases Act, 1898."

By His Excellency's Command,
GEO. COLLINS, Minister for Agriculture.

"THE VEGETATION DISEASES ACT, 1898."

A PROCLAMATION.

WHEREAS I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the Colony of Tasmania and its Dependencies, in Council, did, by a Proclamation dated the twenty-second day of June, one thousand nine hundred, made in pursuance of Section Three of "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), absolutely prohibit the importation, introduction, and bringing into the Colony of Tasmania of any fruit trees, cuttings, scions, buds, and grafts of fruit trees: And whereas it is expedient that such Proclamation as aforesaid should be revoked, and that other provision should be made in lieu thereof: Now, therefore, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief as aforesaid, in Council, in pursuance of the power and authority in me vested by Section Three of the said Act, and of every other power me in this behalf enabling, do hereby revoke my said recited Proclamation: And I hereby absolutely prohibit the importation, introduction, and bringing into the said Colony of Tasmania of all fruit trees, cuttings, scions, buds, and grafts of fruit trees, and the barberry, linden, enonymus, grapevine, maple, acacias, rose, strawberry, raspberry, hawthorn, ash, gooseberry, currants, honeysuckle, lilac, privet, bignonia, elm, oak, birch, alder, chestnut, willow, and poplar, or cuttings, scions, buds, and grafts of any of the same.

Given under my hand, at Hobart, in Tasmania aforesaid, this third day of August, one thousand nine hundred.

GORMANSTON, Govr.

By His Excellency's Command,
GEO. COLLINS, Minister for Agriculture.

GOVERNMENT NOTICE.
No. 257.

Agricultural Department,
Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to issue the following Proclamation, under "The Vegetation Diseases Act, 1898."

By His Excellency's Command,
GEO. COLLINS, Minister for Agriculture.

"THE VEGETATION DISEASES ACT, 1898."

A PROCLAMATION.

WHEREAS I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the Colony of Tasmania and its Dependencies, in Council, did, by a Proclamation dated the twenty-second day of June, one thousand nine hundred, made in pursuance of the provisions of "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), permit the importation, introduction, or bringing into Tasmania of the trees and plants therein named, subject to the performance of such conditions as were prescribed by certain Regulations therein referred to: And whereas it is expedient that such Proclamation as aforesaid should be revoked, and that other provision should be made in lieu thereof: Now, therefore, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief as aforesaid, in Council, in pursuance of the provisions of the said Act, do, by this my Proclamation, permit the importation, introduction, or bringing into Tasmania of any plant or plants (other than fruit trees, cuttings, scions, buds, and grafts of fruit trees, and the barberry, linden, enonymus, grapevine, maple, acacias, rose, strawberry, raspberry, hawthorn, ash, gooseberry,

Chief Secretary's Office,
Brisbane, 14th September, 1900.

THE following Proclamations, issued by His Excellency the Governor of New South Wales in Council, are published for general information.

JAMES R. DICKSON.

PROCLAMATION.

By His Excellency The Right Honourable WILLIAM, EARL BEAUCHAMP, Knight Commander of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief of the Colony of New South Wales and its Dependencies.

WHEREAS the Governor is empowered by section 9 of the "Vegetation Diseases Act, 1897," from time to time by Proclamation in the *Gazette*, to declare any disease affecting plants to be a disease within the meaning of the said Act: Now, therefore, I, WILLIAM, EARL BEAUCHAMP, the Governor aforesaid, with the advice of the Executive Council, do, by this my Proclamation, declare Potato Scab (*Oospora scabies*) to be a disease within the meaning of the said Act.

Given under my Hand and Seal, at Government House, Sydney, this tenth day of August, in the year of our Lord one thousand nine hundred, and in the sixty-fourth year of Her Majesty's reign.

By His Excellency's Command,
JOHN L. FEGAN.

GOD SAVE THE QUEEN!

PROCLAMATION.

By His Excellency The Right Honourable WILLIAM, EARL BEAUCHAMP, Knight Commander of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief of the Colony of New South Wales and its Dependencies.

WHEREAS the Governor is empowered by section 1 of the "Vegetation Diseases Act, 1897," to prohibit, by Proclamation in the *Gazette*, the introduction into this colony of any plant which is likely to introduce any disease or insect into the said Colony: Now, therefore, I, WILLIAM, EARL BEAUCHAMP, the Governor aforesaid, with the advice of the Executive Council, do, by this my Proclamation, prohibit the introduction into this Colony from any place outside the Colony of any plant affected by the disease known as Potato Scab (*Oospora scabies*).

Any plant introduced in contravention to the above Proclamation may be forthwith destroyed, or otherwise dealt with as the Minister may direct.

Given under my Hand and Seal, at Government House, Sydney, this tenth day of August, in the year of our Lord one thousand nine hundred, and in the sixty-fourth year of Her Majesty's reign.

By His Excellency's Command,
JOHN L. FEGAN.

GOD SAVE THE QUEEN!

By Authority: EDMUND GREGORY, Government Printer, William street, Brisbane.

"THE DISEASED ANIMALS IMPORTATION PREVENTION ACT."

A Proclamation.

Whereas His Excellency the Honourable Sir John Stokell Dodds, Knight Companion of the Most Distinguished Order of Saint Michael and Saint George, Chief Justice of the Colony of Tasmania, Administrator of the Government thereof, in Council, did, by a Proclamation under his hand, dated the 26th day of July, one thousand eight hundred and ninety-nine, absolutely prohibit, for a period of Twelve months, the importation into Tasmania of any horses, cattle, and hides from the Colony of Queensland: Now, I, the Right Honourable Jenico William Joseph, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the Colony of Tasmania and its Dependencies, in Council, in pursuance of the power and authority in me vested by Section Three of the Diseased Animals Importation Prevention Act (47 Vict. No. 2), and of every other power me, in this behalf, enabling, do, by this my Proclamation, absolutely prohibit, for Twelve months as from the expiration of the said period, the importation into Tasmania of any horses, cattle, and hides from the said Colony of Queensland.

Given under my hand, at Hobart, in Tasmania aforesaid, this third day of August, one thousand nine hundred.

GORMANSTON, Govr.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

Government Notice.

No. 260.

Agricultural Department,
Hobart, 3rd August, 1900.

The Governor in Council has been pleased to issue the following Proclamation, under "The Contagious Diseases (Cattle) Act, 1861."

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

"THE CONTAGIOUS DISEASES (CATTLE) ACT, 1861."

A Proclamation.

Whereas His Excellency Sir Robert George Crookshank Hamilton, Knight Commander of the Most Honourable Order of the Bath, Governor and Commander-in-Chief in and over the Colony of Tasmania and its Dependencies, did, by Proclamation given under his hand on the eighteenth day of August, one thousand eight hundred and eighty-eight, prohibit the importation into any part of Tasmania, except Hobart and Launceston, of all cattle imported from the colonies of Victoria, New South Wales, Queensland, South Australia, Western Australia, and New Zealand, subject to certain restrictions in such Proclamation set forth: And whereas it is expedient to annul the said Proclamation and to make other provision in lieu thereof: Now, therefore, I, the Right Honourable Jenico William Joseph, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the colony of Tasmania and its Dependencies, in Council, by virtue of the powers conferred on me by "The Contagious Diseases (Cattle) Act, 1861," do hereby annul the hereinbefore-recited Proclamation made as aforesaid under the provisions of the said Act; and I do hereby permit the importation and landing to take place at Hobart and Launceston of all cattle for the purposes of slaughter only imported from the colonies of Victoria, New South Wales, Queensland, South Australia, Western Australia, and New Zealand, subject to the following restrictions:—

1. All such cattle imported into Hobart shall be landed at the cattle jetty, in the River Derwent, near the public slaughter-house for the city of Hobart, and shall be driven from such jetty along the fenced road leading from the said jetty between the Queen's Domain and the said river to the said slaughter-house.
2. All such cattle imported into Launceston shall be landed at the cattle jetty lately erected near the public slaughter-house situate at Inveresk, on the banks of the River Tamar, at a spot known as Home Reach, and shall be driven direct along the race connecting the said jetty with the slaughter-house yards.

   No such cattle shall be landed upon that part of the said jetty which connects with the race leading away from the said public slaughter-house in the direction of the barrier fence erected at a chain radius from the said slaughter-house and the said jetty.
3. The captain or person in command of every ship or other vessel having any such cattle on board to be landed in this Colony shall forthwith, after his arrival in the Colony, notify to the Government Inspector of Stock at Hobart or Launceston, as the case may be, that such ship or other vessel has such cattle on board to be landed in this Colony.
4. All such cattle, upon being landed from any such ship or vessel, shall be inspected by the Government Inspector of Stock at the slaughter-house for Hobart, or at Inveresk, as the case may be; and all such cattle which on such inspection appear to be infected with any contagious or infectious disease shall be immediately killed and disposed of as the said Inspector of Stock may direct.

Given under my hand, at Hobart, in Tasmania aforesaid, this third day of August, one thousand nine hundred.

GORMANSTON, Govr.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

currants, honeysuckle, lilac, privet, bignonia, elm, oak, birch, alder, chestnut, willow, and poplar, or cuttings, scions, buds, and grafts of any of the same, the importation of which is absolutely prohibited), subject to the performance of such conditions as are prescribed, by Regulations made under the said Act bearing even date herewith, or by any Regulations under the said Act which may from time to time be made by me in Council: And I do hereby declare, that unless such conditions prescribed as aforesaid by Regulations made or to be made under the said Act, or any of them, are performed, I do hereby prohibit the importation, introduction, or bringing into Tasmania of any plant or plants so as aforesaid permitted by this my Proclamation to be imported, introduced, or brought into Tasmania.

Given under my hand, at Hobart, in Tasmania aforesaid, this third day of August, one thousand nine hundred.

GORMANSTON, Govr.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

Government Notice.

No. 258.

Agricultural Department,
Hobart, 3rd August, 1900.

The Governor in Council has been pleased to revoke the Regulations made under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), dated the twenty-second day of June, one thousand nine hundred, and to make the following Regulations under the said Act in lieu thereof.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

Regulations.

1. The Regulations made by the Governor in Council under "The Vegetation Diseases Act 1898" (62 Vict. No. 21), and published by Government Notice (No. 213), dated the twenty-second day of June, one thousand nine hundred, are hereby revoked, and replaced by the following Regulations:—

2. Any plant or plants (other than fruit trees, cuttings, scions, buds and grafts of fruit trees, and the barberry, linden, enonymus, grapevine, maple, acacias, rose, strawberry, raspberry, hawthorn, ash, gooseberry, currants, honeysuckle, lilac, privet, bignonia, elm, oak, birch, alder, chestnut, willow, and poplar, or cuttings, scions, buds, and grafts of any of the same, the importation of which is by Proclamation, dated the third day of August, one thousand nine hundred, absolutely prohibited) shall, if imported, introduced, or brought into Tasmania from any of the Australian Colonies or New Zealand, or from Europe, be unpacked for examination by an inspector duly appointed for that purpose, at the port of entry, in a properly constructed fumigating chamber, and the packing destroyed, and such plant or plants shall be fumigated with Hydrocyanic Acid Gas for not less than one hour before delivery, under the supervision of such inspector.

3. Such plants shall, if imported, introduced, or brought into Tasmania from any of the Australian Colonies or New Zealand, be accompanied with a copy of a certificate signed by the Government Entomologist of the exporting country that the nursery in which such plants are grown for export is free from San José Scale; but this Regulation No. 3 shall not be deemed to apply to bulbs.

4. Such plants, before shipment to Tasmania from any of the Australian Colonies or New Zealand, shall be fumigated with Hydrocyanic Acid Gas in a properly constructed fumigating chamber for at least one hour, under the supervision of an inspector duly appointed for that purpose, and a certificate shall be issued by such inspector and forwarded to the Secretary for Agriculture in Tasmania that such fumigation has been properly carried out; but this Regulation No. 4 shall not be deemed to apply to bulbs, or to the importation, introduction, or bringing into Tasmania of same.

5. Any such plants, imported, introduced, or brought into Tasmania from any place whatever, shall be landed at the Ports of Hobart or Launceston, and at no other port in Tasmania.

6. If any such plants, imported, introduced, or brought into Tasmania from any place whatever, are found to contain any pest injurious to fruit trees, such plants shall be destroyed forthwith.

7. All costs and charges of inspection, fumigation, and destruction shall be borne by the consignee: provided that if such consignee be an agent only, all costs and charges as aforesaid shall be borne by the person for whom he is acting, and all costs and charges of inspection and fumigation as aforesaid shall be paid before the delivery of any such plants.

Government Notice.

No. 259.

Agricultural Department,
Hobart, 3rd August, 1900

The Governor in Council has been pleased to issue the following Proclamation under "The Diseased Animals Importation Prevention Act" (47 Vict. No. 2).

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

Public Announcements.

The Editor will be glad to receive any papers of special merit which may be read at meetings of Agricultural and Pastoral Associations in Queensland, reserving, however, the right to decide whether their value and importance will justify their publication.

The *Queensland Agricultural Journal* will be supplied to all members of Agricultural and Horticultural Societies who do not derive their livelihood solely from the land, on payment, in advance, of an annual subscription of 5s.

ADVERTISEMENTS.

Advertisements which relate wholly to the sale of Agricultural Machinery, Seeds, Plants, Manures, Farm Stock, Feeding Stuff, &c., will be inserted in the *Journal* at the following rates:—

	£	s.	d.
Full page, per issue	4	0	0
Half page, per issue	2	10	0
Quarter page, per issue	1	10	0

On advertisements standing for six months a discount of 15 per cent. will be allowed, and 25 per cent. on those inserted for twelve months.

SISAL HEMP PLANTS.

The Department of Agriculture having a quantity of sisal hemp plants and seedlings for gratuitous distribution, intending planters are requested to make early application for the same to the Under Secretary for Agriculture.

LIST OF AGRICULTURAL, HORTICULTURAL, AND PASTORAL SOCIETIES AND ASSOCIATIONS IN QUEENSLAND.

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Allora ...	Central Downs Agricultural and Horticultural Association	J. H. Buxton... ...	Feb.
Ayr	Lower Burdekin Farmers' Association ...	Winsor H. Wilmington	
Beaudesert ...	Logan and Albert Pastoral and Agricultural Society	M. Hinchcliffe ...	11 May
Beenleigh ...	Agricultural and Pastoral Society of Southern Queensland	Wilson Holliday ...	7 Sept.
Biggenden ...	Biggenden Agricultural and Pastoral Society	Charles H. Peppin ...	14 June
Birthamba ...	South Kolan Agricultural and General Progress Association	G. W. Nixon ...	
Blackall ...	Barcoo Pastoral Society	F. Clewett	
Boonah ...	Fassifern and Dugandan Agricultural and Pastoral Association	J. A. McBean ...	14 and 15 June
Bowen ...	Pastoral, Agricultural, and Mining Association	J. E. Smith	9 Aug.
Bowen ...	Proserpine Farmers and Settlers' Association	Joseph Cooper ...	
Booyal ...	Booyal Farmers' Progress Association ...	Thos. Skillington ...	
Brisbane ...	Horticultural Society of Queensland ...	J. F. Bailey	9 Oct.
Brisbane ...	Queensland Acclimatisation Society	E. Grimley	
Brisbane ...	National Agricultural and Industrial Association of Queensland	H. C. Wood	
Brisbane ...	Queensland Fruit and Economic Plantgrowers' Association	J. F. Cooksley ...	
Brisbane ...	Queensland Stockbreeders and Graziers' Association	F. A. Blackman ..	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Brisbane ...	United Pastoralists' Association	Fredk. Ranson ...	
Bundaberg ..	Bundaberg Horticultural and Industrial Society	H. E. Ashley ...	
Bundaberg ...	Council of Agriculture	R. G. Curtis	
Bundaberg ...	Woongarra Canegrowers and Farmers' Association	W. H. Dart	
Burpengary...	Burpengary Farmers' Association	C. H. Ham	
Byrnestown...	Byrnestown Farmers' Progress Association ...	J. Dufficy	
Caboolture ...	Caboolture Farmers' Association	G. Mallet	
Cairns ...	Aloombah Farmers' Association	Chas. R. Spencer ...	
Cairns ...	Cairns Agricultural, Pastoral, and Mining Association	A. J. Draper	5 and 6 Sept.
Cairns ...	Cairns District Coffee-growers' Association ...	W. A. Hannam ...	
Cairns ...	Cairns District United Farmers' Association	Wm. Griffin ...	
Cairns ...	Hambledon Planters' Association	A. M. Stephens ...	
Charleville ..	Central Warrego Pastoral and Agricultural Association	E. F. C. Manning ...	25 and 26 May
Charters Towers	Towers Pastoral, Agricultural, and Mining Association	W. Tilley	30 and 31 May; 1 June
Childers ...	Isis Agricultural Association	H. Epps	
Childers ...	Doolbi Mill Branch, Isis Agricultural Association	W. T. H. Job ...	
Childers ...	Childers Mill Branch, Isis Agricultural Association	H. Epps	
Clermont ...	Peak Downs Pastoral, Horticultural, and Agricultural Society	F. Leysley	
Clermont ...	Peak Downs Dairymen and Settlers' Association	A. G. Pursell ...	
Cooktown ..	Cook District Pastoral and Agricultural Society	W. R. Humphreys ...	
Cooran ...	Cooran Progress and Agricultural Association	Thos. Smith	
Cordalba ..	Cordalba Farmers' Association	B. Goodliffe	
Currajong ...	Currajong Farmers' Progress Association ...	Wm. Howard ...	
Cunnamulla	South Warrego Pastoral Association	J. Winward	
Dalby ...	Northern Downs Pastoral and Agricultural Association	W. M. Alexander ...	July
Dallarnil Scrub, *viâ* Degilbo	Dallarnil Farmers' Association	W. E. Burton ...	
Deception Bay	Deception Bay Farmers' Association	B. J. T. Liscombe ...	
Degilbo ...	Degilbo District Farmers' Association ...	J. Harvey	27 and 28 Dec., 1900
Forest Hill ...	Forest Hill Farmers' Progress Association ...	D. S. Foreman ..	
Gayndah ...	Gayndah Agricultural and Horticultural Association	J. C. Kerr	
Gladstone ...	Gladstone Pastoral and Agricultural Association	W. J. Manning ...	
Glenlyon ...	Afton Downs Farmers' Association	L. J. Landsberg ...	
Gooburrum, Bundaberg	Gooburrum Farmers and Canegrowers' Association	W. J. Tutin	
Goondiwindi	MacIntyre River Pastoral and Agricultural Society	A. Warden	
Gympie ...	Agricultural, Mining, and Pastoral Society	F. Vaughan	13 and 14 Sept.
Gympie ...	Chatsworth Farmers' Progress Association ...	William Bellman ...	
Gympie ...	Deep Creek Farmers' Progress Association ...	W. Reid	
Gympie ...	Gympie Horticultural Society	Charles Brasch ...	19 and 20 April
Gympie ...	The Pie and Eel Creek Farmers' Association	Wm. H. Ryan ...	
Gympie ...	Gympie Central Farmers and Progress Association	J. Howard Maynard	
Haslemore, Victoria, Herbert Riv.	Herbert River Farmers' League	Alfred Henry ...	
Helidon ...	Helidon Scrub Farmers' Progress Association	Jas. Tysoe	
Herbert River	Halifax Planters' Club	H. G. Faithful ...	
Herbert River	Macnade Farmers' Association...	Edwin S. Waller ...	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Herbert River	Ripple Creek Farmers' Association	J. W. Grimes ...	
Herberton ...	Mining, Pastoral, and Agricultural Association	John M. Hollway ...	3 and 4 April
Hodgson ...	Hodgson Farmers' Association	C.W. Nimmo ...	
Hughenden...	Hughenden Pastoral and Agricultural Association	H. P. Blackall ...	7 and 8 May
Ingham ...	Herbert River Farmers' Association	...	
Ingham ...	Herbert River Pastoral and Agricultural Association (Agricultural Show)	P. J. Cochrane ...	Sept.
Ipswich ...	Ipswich and West Moreton Agricultural and Horticultural Society	P. W. Cameron ...	27 Sept.
Ipswich ...	Queensland Pastoral and Agricultural Society	Elias Harding ...	11 and 12 July
Kandanga (near Gympie)	Kandanga Farmers' Association	N. Rasmussen ...	
Kolan ...	Kolan Canegrowers and Farmers' Association	C. Marks	
Ladeside ...	Mungore Farmers' Association...	I. M. Robinson ...	
Laidley ...	Lockyer Agricultural and Industrial Society (Ploughing Match, Laidley)	John Fielding ...	11 Oct.
Loganholme...	Logan Farming and Industrial Association ...	F. W. Peek	
Longreach ...	Longreach Pastoral and Agricultural Society	J. P. Peterson ...	17 and 18 April
Lucinda Point	Victoria Farmers' Association	W. S. C. Warren ...	
Mackay ...	Agricultural, Pastoral, and Mining Association	F. Black	
Mackay ...	Pioneer River Farmers' Association	E. Swayne	28 and 29 June
Mackay ...	The Mackay and District Horticultural Society	Fred. Bourne ...	
Mapleton, *viâ* Nambour	Mapleton and Dulong Fruitgrowers and Farmers' Progress Association	W. J. Smith	
Maryborough	Maryborough Horticultural Society	H. A. Jones	
Maryborough	The Island Farmers' Progress Association ...	C. A. Schmidt ...	
Maryborough	Wide Bay and Burnett Pastoral and Agricultural Society	G. Willey	4, 5, and 6 July
Miallo ...	Miallo Progress Association	E. F. Welchman ...	
Miara, Yandaran	Avondale Farmers and Planters' Association	F. E. Eggar	
Milbong ...	Milbong Farmers' Association	T. R. Garrick ...	
Mitchell ...	Mitchell and Maranoa Pastoral, Agricultural, and Vinegrowers' Association	H. J. Corbett ...	
Mosman River	Mosman River Farmers' Association	Geo. W. Muntz ...	
Mount Cotton	Mount Cotton and Tingalpa Division Fruitgrowers and Farmers' Association	F. N. Sharman ...	
Mount Mee...	Mount Mee Farmers' Association	R. Thomas	
Mount Morgan	Mount Morgan Agricultural, Pastoral, and Poultry Society	Thos. W. Walker ...	
Nerang ...	South Queensland and Border Pastoral and Agricultural Society	W. J. Browne ...	5 Oct.
North Isis ...	North Isis Canegrowers' Association	W. J. Young ...	
North Pine ...	Moreton Agricultural, Horticultural, and Industrial Association	J. Duffield	
Pialba ...	Pialba Farmers' Association	J. B. Stephens ...	
Pinbarren ...	Pinbarren Agricultural and Progress Association	H. Armitage, senr. ...	
Port Douglas	Pastoral, Agricultural, and Mining Association	W. H. Dorrat ...	2 Aug.
Razorback ...	The Razorback Fruitgrowers' Association ...	Robert Tinning ...	
Rockhampton	Central Queensland Farmers and Selectors' Association	T. Whitely, Coowonga	
Rockhampton	Central Queensland Stockowners' Association	R. R. Dawbarn ...	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Rockhampton	Rockhampton Agricultural Society	R. R. Dawbarn ...	29 and 30 May
Roma ...	Western Pastoral and Agricultural Association of Queensland	Angus McPherson ...	
Roma ...	Yingerbay Farmers' Association	Alex. C. McIntyre ...	
Rosewood ...	Farmers' Club	P. H. Adams... ...	4 Oct.
Southport ...	Southport Horticultural Society	E. Fass	19 April
Springsure ...	Queensland Pastoral Society	G. R. Milliken ...	
Stanthorpe ...	Border Pastoral, Agricultural, and Mining Society	Geo. Simcocks ...	22 and 23 Feb.
Stanthorpe ...	Stanthorpe Horticultural and Viticultural Society	R. Hoggan	
Stanwell ...	The Stanwell Agricultural Society	A. Spanner	
St. George ...	Balonne Pastoral and Agricultural Association	T. M. Cummings ...	
Tinana ...	Tinana Fruitgrowers and Farmers' Association	Chas. Parke	
Toowoomba...	Darling Downs Horticultural Association ...	H. Hopkins	
Toowoomba...	Drayton and Toowoomba Agricultural and Horticultural Society	H. Symes	16 and 17 Jan., 1901
Toowoomba...	Royal Agricultural Society of Queensland ...	F. Burtt	31 July; 1 and 2 Aug.
Townsville ...	Townsville Pastoral, Agricultural, and Industrial Association (formerly North Queensland Pastoral and Agricultural Association)	J. N. Parkes	6 and 7 June
Upper North Pine	Upper North Pine Farmers' Association ...	J. Skerman	
Wallumbilla	Wallumbilla Selectors' League	George Dalziel ..	
Warwick ...	Eastern Downs Horticultural and Agricultural Association	J. Selke	31 Jan. & 1 Feb.
Wellington Point	Wellington Point Agricultural, Horticultural, and Industrial Association	F. W. Wort	13 June
Woombye ...	Woombye Fruitgrowers' Association	P. S. Hungerford ...	
Woowoonga	Woowoonga Scrub Farmers' Association ...	G. T. Worth	
Zillmere ...	Zillmere Horticultural Society	C. M. F. Fischer ...	20 Jan.

GOVERNMENT AGRICULTURAL LABORATORY.

INSTRUCTION FOR THE COLLECTION OF SAMPLES, AND SCALE OF FEES.

GENERAL INSTRUCTIONS.

1. All analyses are carried out in their turn as they arrive at the Laboratory.

2. Should a customer wish for an immediate analysis, the fee, as provided by scale of fees below, will be increased by 50 per cent.

3. The samples may be forwarded by parcel post or by rail, either to the Under Secretary for Agriculture, Brisbane, or direct to the Chemist, Agricultural Laboratory, at the Agricultural College, Gatton; but in any case the required fee must be transmitted at the same time.

4. Analyses will be only carried out, if samples are taken strictly in accordance with the instructions issued below.

SCALE OF FEES.

	Farmers, Selectors, Gardeners. £	s.	d.
Soil—Short analysis (estimation of lime, alkalies, nitrogen, and phosphoric acid) ...	2	2	0
Soil and subsoil—Short analysis ...	3	3	0
Soil—Complete analysis ...	4	4	0
Water—Analysis ...	3	3	0
Manures—			
Complete analysis ...	2	2	0
Nitrogen only ...	0	7	6
Potash only ...	0	7	6
Phosphoric acid sol. ...	0	15	0
Phosphoric acid insol. ...	0	15	0

SCALE OF FEES—*continued.*

	Farmers, Selectors, Gardeners. £ s. d
Food Stuffs—	
Complete analysis	2 2 0
Water only	0 5 0
Albuminoids	0 10 0
Oil or fat	0 7 6
Ash	0 5 0
Fibre	0 7 6
Sugar-cane, sugar-beet, megass—Analysis of	1 1 0
Sugar, massecuite, jelly, molasses	1 1 0
Milk, butter, cheese—Complete analysis	1 0 0
Tanning materials (tannin estim.)	1 0 0
Soaps	1 10 0
Limestone, cement, clay, &c.	3 0 0

INSTRUCTIONS FOR TAKING AND COLLECTING OF SAMPLES.

SOILS AND SUBSOILS.

To obtain a fair average sample of the soil of a block of land, as near as possible equal quantities of soil are taken from various parts of the fields.

A sketch plan of the field, paddock, or block of land on which the samples were taken should accompany the samples, and the spots where samples are taken are marked on this plan and numbered. This sketch plan should also indicate position of roads, creeks, gullies, ridges, general fall of the land, &c.

Should the soil in various parts of the block show a very marked difference, it will be necessary to divide the block into two, rarely in more, parts. Should the different soil occur only in a small patch, this sample may be left out.

Not less than three samples should be taken in each section. A greater number is to be preferred, as a better average will be obtained.

At the places chosen for the taking of the samples the surface is slightly scraped with a sharp tool, to remove any surface vegetation which has not as yet become part of the soil.

Vertical holes from 10 to 18 inches square are dug in the ground to a depth of 2 feet 6 inches to 3 feet.

The holes are dug out like post-holes; an earth-auger facilitates the operation considerably, and the holes may be trimmed with the spade afterwards.

Careful note of the appearance of the freshly cut soil and subsoil should be taken. The depth of the real soil, which in most cases is easily distinguished, is also measured and noted for each hole. Note how deep the roots of the surface vegetation reach into the soil. If the soil changes gradually into the subsoil, as is the case in some places where the soil is of very great depth, this line of division is guessed approximately, or it is best to take the soil uniformly to a depth of 12 inches.

With a spade a slice of soil is now cut off and put on to a clean bag. The same is done with the subsoil, and the slice is taken from where the soil ends (or 12 inches) to the bottom of the hole, and this subsoil placed on another bag. Stones over the size of a pea may be picked out, the rough quantity of such stones estimated, and a few enclosed with the samples. Fine roots must not be taken out from the soil samples. The same operation is repeated at the other places chosen. Careful note and description in each hole, as numbered and marked on plan given, and the samples of soil collected on the one bag thoroughly mixed by breaking up any large clods, and about 10 lb. of the mixture put into a clean canvas bag, which is securely tied up and labelled. The same is done with the samples of subsoil collected on the other bag.

All the samples collected are afterwards placed into a wooden box.

It is important to use clean bags and clean boxes, and also that the samples should not be left in the neighbourhood of stables or manure heaps. A short description of the land must accompany the samples and the sketch plan.

In the case of cultivated land, state how long the land was under cultivation, what crops were chiefly grown, result of such crops, was any manure applied, when, and what sort, and in what quantities per acre. In the case of virgin soil, state if the land was heavily timbered or not, ringbarked, if scrub or forest land, what sort of timber was chiefly growing on the land. In all cases a description of the neighbouring land, outcropping rocks, &c., are of great value. Also state if the land is naturally or artificially drained or not; describe the land as regards its position to hills, roads, creeks, ridges, &c. Only by adhering strictly to these instructions, and by giving minute details, benefit can be derived from the soil analyses.

WATER.

It is best to collect and forward samples of water for analysis in stoppered glass bottles, generally known as Winchester quarts.

The bottles have to be perfectly clean, and stoppers must fit well. Corks should be avoided, but if used must be new and well washed with the water before being used for closing the bottle.

When taking waters from taps, pumps, bores, the water has to be allowed to run for a while before taking the sample. When taking the water out of a well, pond, or river, the bottle is completely immersed, but care has to be taken not to disturb the mud or sediment at the bottom of the water. Before the sample is actually collected, the bottle is rinsed three times with the water, filling each time about one-third full. The bottle is then filled within about 1 inch from the top; the stopper is inserted and securely tied down with a clean piece of linen or calico.

The stopper must not be fastened or luted with sealing-wax, paste, plaster of paris, &c.

MANURES.

When taking samples of artificial manures out of bags, the sample must be taken from different bags and at different places of the bag and not only from the top, or the bags before being used are emptied on a heap and mixed up well and the sample then taken. About 1 to 2 lb. put into a clean bag should be forwarded for analysis.

FOOD STUFFS.

It is always important to obtain good average samples, and this can only be done by great care in taking the samples from different places, mixing well, and taking a small part of the mixture. This method would apply to any dry foodstuff—as grains of any kind, peas, beans, chaff, pollard, meal, &c. For the analysis of green foods—as green hay, sorghum, silage—it is best to make a mixture of the sample by passing it through a chaffcutter, and by taking an accurately weighed quantity—say 1 lb. This quantity may then be dried in the sun, taking care that nothing is lost, and when dry put in a bag and forwarded for analysis. The green samples may also be forwarded without drying in fruit-preserving jars.

To collect information about value of *green manures*, it is best to plot out exactly one square yard in the field covered with the plant, not picking out a position where the growth is very heavy or poor, but about a fair average. Four pegs are driven into the ground at the four corners, and string stretched between them; with a sharp spade all the plants are cut along the strings, so as to get really the growth of 1 square yard. The plants are all collected and accurately weighed, passed through a chaffcutter, and the sample for analysis taken as above described. In many cases the roots may be also pulled out, weighed separately, and a sample forwarded.

The samples have to be accompanied by a description of the crop—when planted, how old when cut, if the land was manured or not, weight of crop per acre or per square yard, and weight of the sample forwarded when in its green state. In the case of green manures it is generally best to take the samples at the same time when ploughed under, just after flowering.

Chief Secretary's Office,
Brisbane, 20th July, 1900.

THE following Proclamation, issued by His Excellency the Governor of Tasmania in Council, is published for general information.

ROBERT PHILP.

GOVERNMENT NOTICE.
No. 212.

Agricultural Department,
Hobart, 23rd June, 1900.

THE Governor in Council has been pleased to issue the following Proclamation, under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21).

By His Excellency's Command,
GEO. COLLINS, Minister for Agriculture.

"THE VEGETATION DISEASES ACT, 1898."

A PROCLAMATION.

WHEREAS it is expedient to permit the importation, introduction, or bringing into Tasmania of all citrous trees, cone-bearing trees, ferns, cacti, geraniums, bulbs, and all other plants (excepting fruit trees, cuttings, scions, buds and grafts of fruit trees, the importation of which

is absolutely prohibited), subject to the performance of such conditions as are prescribed by Regulations made under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), bearing even date herewith, or by any Regulations under the said Act which may from time to time be made by me in Council: Now, therefore, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the colony of Tasmania and its Dependencies, in Council, in pursuance of the provisions of the said Act, do, by this my Proclamation, permit the importation, introduction, or bringing into Tasmania of all citrous trees, cone-bearing trees, ferns, cacti, geraniums, bulbs, and all other plants (excepting fruit trees, cuttings, scions, buds, and grafts of fruit trees, the importation of which is absolutely prohibited), subject to the performance of such conditions as are prescribed by Regulations made under the said Act bearing even date herewith, or by any Regulations under the said Act which may from time to time be made by me, in Council: And I do hereby declare, that unless such conditions prescribed as aforesaid by Regulations made or to be made under the said Act, or any of them, are performed, I do hereby prohibit the importation, introduction, or bringing into Tasmania of the trees and plants so as aforesaid permitted by this my Proclamation to be imported, introduced or brought into Tasmania.

Given under my hand at Hobart, in Tasmania aforesaid, this twenty-second day of June, one thousand nine hundred.

GORMANSTON, Governor.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

Chief Secretary's Office,
Brisbane, 25th July, 1900.

THE following Regulations, made by His Excellency the Governor of Tasmania in Council, under "The Vegetation Diseases Act, 1898," are published for general information.

ROBERT PHILP.

GOVERNMENT NOTICE.
No. 213.

Agricultural Department,
Hobart, 22nd June, 1900.

THE Governor in Council has been pleased to make the following Regulations, under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21).

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

REGULATIONS.

1. Any nursery in which plants are grown for export to Tasmania shall hold a Certificate, signed by the Government Entomologist of the exporting country, that such nursery is free from all pests injurious to fruit trees; and such Certificate shall be forwarded to the Secretary for Agriculture in Tasmania.

2. Such plants as aforesaid shall be inspected by an Inspector of the Department of Agriculture of the said exporting country, duly appointed for that purpose, and, if found to be free from all pests injurious to fruit trees, a Certificate shall be issued to that effect by the said Inspector and forwarded to the Secretary for Agriculture in Tasmania.

3. All citrous trees, cone-bearing trees, ferns, cacti, geraniums, bulbs, or any plant (other than fruit trees, cuttings, scions, buds, and grafts of fruit trees), shall, before shipment to Tasmania, be fumigated with Hydrocyanic Acid Gas in a properly constructed fumigating chamber, for at least one hour, under the supervision of an Inspector duly appointed for that purpose, and a Certificate shall be issued by such Inspector, and forwarded to the Secretary for Agriculture in Tasmania, that such fumigation has been properly carried out.

4. The plants above mentioned shall be unpacked for examination by an Inspector at the port of entry, in a fumigating chamber, and the packing destroyed. If, in the opinion of the Government Entomologist of Tasmania, the plants above mentioned can safely be introduced into Tasmania, such plants shall be fumigated with Hydrocyanic Acid Gas in a properly constructed fumigating chamber, for not less than one hour before delivery, under the supervision of an Inspector duly appointed for that purpose in Tasmania, and a Certificate shall be issued by such Inspector, and forwarded to the Secretary for Agriculture for Tasmania, that such fumigation has been properly carried out.

5. The plants above mentioned shall be landed at the ports of Hobart and Launceston, and at no other port in Tasmania.

6. If any such plants are found to contain any pest the same shall be destroyed forthwith.

7. All costs and charges of inspection, fumigation, and destruction shall be borne by the consignee, provided that if such consignee be an agent only, all costs and charges as aforesaid shall be borne by the person for whom he is acting.

Chief Secretary's Office,
Brisbane, 4th September, 1900.

THE following Proclamations and Regulations, issued by His Excellency the Governor of Tasmania in Council, are published for general information.

JAMES R. DICKSON.

GOVERNMENT NOTICE.
No. 256.

Agricultural Department,
Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to issue the following Proclamation under "The Vegetation Diseases Act, 1898."

By His Excellency's Command,
GEO. COLLINS, Minister for Agriculture.

"THE VEGETATION DISEASES ACT, 1898."

A PROCLAMATION.

WHEREAS I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the Colony of Tasmania and its Dependencies, in Council, did, by a Proclamation dated the twenty-second day of June, one thousand nine hundred, made in pursuance of Section Three of "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), absolutely prohibit the importation, introduction, and bringing into the Colony of Tasmania of any fruit trees, cuttings, scions, buds, and grafts of fruit trees: And whereas it is expedient that such Proclamation as aforesaid should be revoked, and that other provision should be made in lieu thereof: Now, therefore, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief as aforesaid, in Council, in pursuance of the power and authority in me vested by Section Three of the said Act, and of every other power me in this behalf enabling, do hereby revoke my said recited Proclamation: And I hereby absolutely prohibit the importation, introduction, and bringing into the said Colony of Tasmania of all fruit trees, cuttings, scions, buds, and grafts of fruit trees, and the barberry, linden, enonymus, grapevine, maple, acacias, rose, strawberry, raspberry, hawthorn, ash, gooseberry, currants, honeysuckle, lilac, privet, bignonia, elm, oak, birch, alder, chestnut, willow, and poplar, or cuttings, scions, buds, and grafts of any of the same.

Given under my hand, at Hobart, in Tasmania aforesaid, this third day of August, one thousand nine hundred.

GORMANSTON, Govr.

By His Excellency's Command,
GEO. COLLINS, Minister for Agriculture.

GOVERNMENT NOTICE.
No. 257.

Agricultural Department,
Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to issue the following Proclamation, under "The Vegetation Diseases Act, 1898."

By His Excellency's Command,
GEO. COLLINS, Minister for Agriculture.

"THE VEGETATION DISEASES ACT, 1898."

A PROCLAMATION.

WHEREAS I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the Colony of Tasmania and its Dependencies, in Council, did, by a Proclamation dated the twenty-second day of June, one thousand nine hundred, made in pursuance of the provisions of "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), permit the importation, introduction, or bringing into Tasmania of the trees and plants therein named, subject to the performance of such conditions as were prescribed by certain Regulations therein referred to: And whereas it is expedient that such Proclamation as aforesaid should be revoked, and that other provision should be made in lieu thereof: Now, therefore, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief as aforesaid, in Council, in pursuance of the provisions of the said Act, do, by this my Proclamation, permit the importation, introduction, or bringing into Tasmania of any plant or plants (other than fruit trees, cuttings, scions, buds, and grafts of fruit trees, and the barberry, linden, enonymus, grapevine, maple, acacias, rose, strawberry, raspberry, hawthorn, ash, gooseberry,

currants, honeysuckle, lilac, privet, bignonia, elm, oak, birch, alder, chestnut, willow, and poplar, or cuttings, scions, buds, and grafts of any of the same, the importation of which is absolutely prohibited), subject to the performance of such conditions as are prescribed, by Regulations made under the said Act bearing even date herewith, or by any Regulations under the said Act which may from time to time be made by me in Council: And I do hereby declare, that unless such conditions prescribed as aforesaid by Regulations made or to be made under the said Act, or any of them, are performed, I do hereby prohibit the importation, introduction, or bringing into Tasmania of any plant or plants so as aforesaid permitted by this my Proclamation to be imported, introduced, or brought into Tasmania.

Given under my hand, at Hobart, in Tasmania aforesaid, this third day of August, one thousand nine hundred.

GORMANSTON, Govr.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

GOVERNMENT NOTICE.

No. 258.

Agricultural Department,
Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to revoke the Regulations made under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), dated the twenty-second day of June, one thousand nine hundred, and to make the following Regulations under the said Act in lieu thereof.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

REGULATIONS.

1. The Regulations made by the Governor in Council under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), and published by Government Notice (No. 213), dated the twenty-second day of June, one thousand nine hundred, are hereby revoked, and replaced by the following Regulations:—

2. Any plant or plants (other than fruit trees, cuttings, scions, buds and grafts of fruit trees, and the barberry, linden, enonymus, grapevine, maple, acacias, rose, strawberry, raspberry, hawthorn, ash, gooseberry, currants, honeysuckle, lilac, privet, bignonia, elm, oak, birch, alder, chestnut, willow, and poplar, or cuttings, scions, buds, and grafts of any of the same, the importation of which is by Proclamation, dated the third day of August, one thousand nine hundred, absolutely prohibited) shall, if imported, introduced, or brought into Tasmania from any of the Australian Colonies or New Zealand, or from Europe, be unpacked for examination by an inspector duly appointed for that purpose, at the port of entry, in a properly constructed fumigating chamber, and the packing destroyed, and such plant or plants shall be fumigated with Hydrocyanic Acid Gas for not less than one hour before delivery, under the supervision of such inspector.

3. Such plants shall, if imported, introduced, or brought into Tasmania from any of the Australian Colonies or New Zealand, be accompanied with a copy of a certificate signed by the Government Entomologist of the exporting country that the nursery in which such plants are grown for export is free from San José Scale; but this Regulation No. 3 shall not be deemed to apply to bulbs.

4. Such plants, before shipment to Tasmania from any of the Australian Colonies or New Zealand, shall be fumigated with Hydrocyanic Acid Gas in a properly constructed fumigating chamber for at least one hour, under the supervision of an inspector duly appointed for that purpose, and a certificate shall be issued by such inspector and forwarded to the Secretary for Agriculture in Tasmania that such fumigation has been properly carried out; but this Regulation No. 4 shall not be deemed to apply to bulbs, or to the importation, introduction, or bringing into Tasmania of same.

5. Any such plants, imported, introduced, or brought into Tasmania from any place whatever, shall be landed at the Ports of Hobart or Launceston, and at no other port in Tasmania.

6. If any such plants, imported, introduced, or brought into Tasmania from any place whatever, are found to contain any pest injurious to fruit trees, such plants shall be destroyed forthwith.

7. All costs and charges of inspection, fumigation, and destruction shall be borne by the consignee: provided that if such consignee be an agent only, all costs and charges as aforesaid shall be borne by the person for whom he is acting, and all costs and charges of inspection and fumigation as aforesaid shall be paid before the delivery of any such plants.

GOVERNMENT NOTICE.

No. 259.

Agricultural Department,
Hobart, 3rd August, 1900

THE Governor in Council has been pleased to issue the following Proclamation under "The Diseased Animals Importation Prevention Act" (47 Vict. No. 2)

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

"THE DISEASED ANIMALS IMPORTATION PREVENTION ACT."

A Proclamation.

Whereas His Excellency the Honourable Sir John Stokell Dodds, Knight Companion of the Most Distinguished Order of Saint Michael and Saint George, Chief Justice of the Colony of Tasmania, Administrator of the Government thereof, in Council, did, by a Proclamation under his hand, dated the 26th day of July, one thousand eight hundred and ninety-nine, absolutely prohibit, for a period of Twelve months, the importation into Tasmania of any horses, cattle, and hides from the Colony of Queensland: Now, I, the Right Honourable Jenico William Joseph, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the Colony of Tasmania and its Dependencies, in Council, in pursuance of the power and authority in me vested by Section Three of the Diseased Animals Importation Prevention Act (47 Vict. No. 2), and of every other power me, in this behalf, enabling, do, by this my Proclamation, absolutely prohibit, for Twelve months as from the expiration of the said period, the importation into Tasmania of any horses, cattle, and hides from the said Colony of Queensland.

Given under my hand, at Hobart, in Tasmania aforesaid, this third day of August, one thousand nine hundred.

GORMANSTON, Govr.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

Government Notice.

No. 260.

Agricultural Department,
Hobart, 3rd August, 1900.

The Governor in Council has been pleased to issue the following Proclamation, under "The Contagious Diseases (Cattle) Act, 1861."

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

"THE CONTAGIOUS DISEASES (CATTLE) ACT, 1861."

A Proclamation.

Whereas His Excellency Sir Robert George Crookshank Hamilton, Knight Commander of the Most Honourable Order of the Bath, Governor and Commander-in-Chief in and over the Colony of Tasmania and its Dependencies, did, by Proclamation given under his hand on the eighteenth day of August, one thousand eight hundred and eighty-eight, prohibit the importation into any part of Tasmania, except Hobart and Launceston, of all cattle imported from the colonies of Victoria, New South Wales, Queensland, South Australia, Western Australia, and New Zealand, subject to certain restrictions in such Proclamation set forth: And whereas it is expedient to annul the said Proclamation and to make other provision in lieu thereof: Now, therefore, I, the Right Honourable Jenico William Joseph, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the colony of Tasmania and its Dependencies, in Council, by virtue of the powers conferred on me by "The Contagious Diseases (Cattle) Act, 1861," do hereby annul the hereinbefore-recited Proclamation made as aforesaid under the provisions of the said Act; and I do hereby permit the importation and landing to take place at Hobart and Launceston of all cattle for the purposes of slaughter only imported from the colonies of Victoria, New South Wales, Queensland, South Australia, Western Australia, and New Zealand, subject to the following restrictions:—

1. All such cattle imported into Hobart shall be landed at the cattle jetty, in the River Derwent, near the public slaughter-house for the city of Hobart, and shall be driven from such jetty along the fenced road leading from the said jetty between the Queen's Domain and the said river to the said slaughter-house.
2. All such cattle imported into Launceston shall be landed at the cattle jetty lately erected near the public slaughter-house situate at Inveresk, on the banks of the River Tamar, at a spot known as Home Reach, and shall be driven direct along the race connecting the said jetty with the slaughter-house yards.

   No such cattle shall be landed upon that part of the said jetty which connects with the race leading away from the said public slaughter-house in the direction of the barrier fence erected at a chain radius from the said slaughter-house and the said jetty.
3. The captain or person in command of every ship or other vessel having any such cattle on board to be landed in this Colony shall forthwith, after his arrival in the Colony, notify to the Government Inspector of Stock at Hobart or Launceston, as the case may be, that such ship or other vessel has such cattle on board to be landed in this Colony.
4. All such cattle, upon being landed from any such ship or vessel, shall be inspected by the Government Inspector of Stock at the slaughter-house for Hobart, or at Inveresk, as the case may be; and all such cattle which on such inspection appear to be infected with any contagious or infectious disease shall be immediately killed and disposed of as the said Inspector of Stock may direct.

Given under my hand, at Hobart, in Tasmania aforesaid, this third day of August, one thousand nine hundred.

GORMANSTON, Govr.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

Chief Secretary's Office,
Brisbane, 14th September, 1900.

THE following Proclamations, issued by His Excellency the Governor of New South Wales in Council, are published for general information.

JAMES R. DICKSON.

PROCLAMATION.

By His Excellency The Right Honourable WILLIAM, EARL BEAUCHAMP, Knight Commander of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief of the Colony of New South Wales and its Dependencies.

WHEREAS the Governor is empowered by section 9 of the "Vegetation Diseases Act, 1897," from time to time by Proclamation in the *Gazette*, to declare any disease affecting plants to be a disease within the meaning of the said Act: Now, therefore, I, WILLIAM, EARL BEAUCHAMP, the Governor aforesaid, with the advice of the Executive Council, do, by this my Proclamation, declare Potato Scab (*Oospora scabies*) to be a disease within the meaning of the said Act.

Given under my Hand and Seal, at Government House, Sydney, this tenth day of August, in the year of our Lord one thousand nine hundred, and in the sixty-fourth year of Her Majesty's reign.

By His Excellency's Command,

JOHN L. FEGAN.

GOD SAVE THE QUEEN!

PROCLAMATION.

By His Excellency The Right Honourable WILLIAM, EARL BEAUCHAMP, Knight Commander of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief of the Colony of New South Wales and its Dependencies.

WHEREAS the Governor is empowered by section 1 of the "Vegetation Diseases Act, 1897," to prohibit, by Proclamation in the *Gazette*, the introduction into this colony of any plant which is likely to introduce any disease or insect into the said Colony: Now, therefore, I, WILLIAM, EARL BEAUCHAMP, the Governor aforesaid, with the advice of the Executive Council, do, by this my Proclamation, prohibit the introduction into this Colony from any place outside the Colony of any plant affected by the disease known as Potato Scab (*Oospora scabies*).

Any plant introduced in contravention to the above Proclamation may be forthwith destroyed, or otherwise dealt with as the Minister may direct.

Given under my Hand and Seal, at Government House, Sydney, this tenth day of August, in the year of our Lord one thousand nine hundred, and in the sixty-fourth year of Her Majesty's reign.

By His Excellency's Command,

JOHN L. FEGAN.

GOD SAVE THE QUEEN!

By Authority: EDMUND GREGORY, Government Printer, William street, Brisbane.

Public Announcements.

The Editor will be glad to receive any papers of special merit which may be read at meetings of Agricultural and Pastoral Associations in Queensland, reserving, however, the right to decide whether their value and importance will justify their publication.

The *Queensland Agricultural Journal* will be supplied to all members of Agricultural and Horticultural Societies who do not derive their livelihood solely from the land, on payment, in advance, of an annual subscription of 5s.

ADVERTISEMENTS.

Advertisements which relate wholly to the sale of Agricultural Machinery, Seeds, Plants, Manures, Farm Stock, Feeding Stuff, &c., will be inserted in the *Journal* at the following rates :—

	£	s.	d.
Full page, per issue	4	0	0
Half page, per issue	2	10	0
Quarter page, per issue	1	10	0

On advertisements standing for six months a discount of 15 per cent. will be allowed, and 25 per cent. on those inserted for twelve months.

SISAL HEMP PLANTS.

The Department of Agriculture having a quantity of sisal hemp plants and seedlings for gratuitous distribution, intending planters are requested to make early application for the same to the Under Secretary for Agriculture.

LIST OF AGRICULTURAL, HORTICULTURAL, AND PASTORAL SOCIETIES AND ASSOCIATIONS IN QUEENSLAND.

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Allora ...	Central Downs Agricultural and Horticultural Association	J. H. Buxton... ...	Feb.
Ayr	Lower Burdekin Farmers' Association ...	Winsor H. Wilmington	
Beaudesert ...	Logan and Albert Pastoral and Agricultural Society	M. Hinchcliffe ...	11 May
Beenleigh ...	Agricultural and Pastoral Society of Southern Queensland	Wilson Holliday ...	7 Sept.
Biggenden ...	Biggenden Agricultural and Pastoral Society	Charles H. Peppin ...	13 and 14 June
Birthamba ...	South Kolan Agricultural and General Progress Association	G. W. Nixon ...	
Blackall ...	Barcoo Pastoral Society	F. Clewett	
Boonah ...	Fassifern and Dugandan Agricultural and Pastoral Association	J. A. McBean ...	14 and 15 June
Bowen ...	Pastoral, Agricultural, and Mining Association	J. E. Smith	9 Aug.
Bowen ...	Proserpine Farmers and Settlers' Association	Joseph Cooper ...	
Booyal ...	Booyal Farmers' Progress Association ...	Thos. Skillington ...	
Brisbane ...	Horticultural Society of Queensland	J. F. Bailey	April
Brisbane ...	Queensland Acclimatisation Society	E. Grimley	
Brisbane ...	National Agricultural and Industrial Association of Queensland	H. C. Wood	
Brisbane ...	Queensland Fruit and Economic Plantgrowers' Association	J. F. Cooksley ...	
Brisbane ...	Queensland Stockbreeders and Graziers' Association	F. A. Blackman ..	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Brisbane ...	United Pastoralists' Association	Fredk. Ranson ...	
Bundaberg ...	Bundaberg Horticultural and Industrial Society	H. E. Ashley ...	
Bundaberg ...	Council of Agriculture	R. G. Curtis	
Bundaberg ...	Woongarra Canegrowers and Farmers' Association	W. H. Dart	
Burpengary...	Burpengary Farmers' Association	C. H. Ham	
Byrnestown...	Byrnestown Farmers' Progress Association ...	J. Duffícy	
Caboolture ...	Caboolture Farmers' Association	G. Mallet	
Cairns ...	Aloombah Farmers' Association	Chas. R. Spencer ...	
Cairns ...	Cairns Agricultural, Pastoral, and Mining Association	A. J. Draper... ...	5 and 6 Sept.
Cairns ...	Cairns District Coffee-growers' Association ...	W. A. Hannam ...	
Cairns ...	Cairns District United Farmers' Association	Wm. Griffin ...	
Cairns ...	Hambledon Planters' Association	A. M. Stephens ...	
Charleville ..	Central Warrego Pastoral and Agricultural Association	E. F. C. Manning ...	25 and 26 May
Charters Towers	Towers Pastoral, Agricultural, and Mining Association	W. Tilley	30 and 31 May; 1 June
Childers ...	Isis Agricultural Association	H. Epps	
Childers ...	Doolbi Mill Branch, Isis Agricultural Association	W. T. H. Job ...	
Childers ...	Childers Mill Branch, Isis Agricultural Association	H. Epps	
Clermont ...	Peak Downs Pastoral, Horticultural, and Agricultural Society	F. Leysley	
Clermont ...	Peak Downs Dairymen and Settlers' Association	A. G. Pursell ...	
Cooktown ..	Cook District Pastoral and Agricultural Society	W. R. Humphreys ...	
Cooran ...	Cooran Progress and Agricultural Association	Thos. Smith	
Cordalba ...	Cordalba Farmers' Association	B. Goodliffe	
Currajong ...	Currajong Farmers' Progress Association ...	Wm. Howard ...	
Cunnamulla	South Warrego Pastoral Association	J. Winward	
Dalby ...	Northern Downs Pastoral and Agricultural Association	W. M. Alexander ...	July
Dallarnil Scrub, *viâ* Degilbo	Dallarnil Farmers' Association	W. E. Burton ...	
Deception Bay	Deception Bay Farmers' Association	B. J. T. Liscombe ...	
Degilbo ...	Degilbo District Farmers' Association ...	J. Harvey	27 and 28 Dec., 1900
Forest Hill ...	Forest Hill Farmers' Progress Association ...	D. S. Foreman ..	
Gayndah ...	Gayndah Agricultural and Horticultural Association	J. C. Kerr	
Gladstone ...	Gladstone Pastoral and Agricultural Association	W. J. Manning ...	
Glenlyon ...	Afton Downs Farmers' Association	L. J. Landsberg ...	
Gooburrum, Bundaberg	Gooburrum Farmers and Canegrowers' Association	W. J. Tutin	
Goondiwindi	MacIntyre River Pastoral and Agricultural Society	A. Warden	
Gympie ...	Agricultural, Mining, and Pastoral Society	F. Vaughan	13 and 14 Sept.
Gympie ...	Chatsworth Farmers' Progress Association ...	William Bellman ...	
Gympie ...	Deep Creek Farmers' Progress Association ...	W. Reid	
Gympie ...	Gympie Horticultural Society	Charles Brasch ...	19 and 20 April
Gympie ...	The Pie and Eel Creek Farmers' Association	Wm. H. Ryan ...	
Gympie ...	Gympie Central Farmers and Progress Association	J. Howard Maynard	
Haslemore, Victoria, Herbert Riv.	Herbert River Farmers' League	Alfred Henry ...	
Helidon ...	Helidon Scrub Farmers' Progress Association	Jas. Tysoe	
Herbert River	Halifax Planters' Club	H. G. Faithful ...	
Herbert River	Macnade Farmers' Association...	Edwin S. Waller ...	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Herbert River	Ripple Creek Farmers' Association	J. W. Grimes ...	
Herberton ...	Mining, Pastoral, and Agricultural Association	John M. Hollway ...	3 and 4 April
Hodgson ...	Hodgson Farmers' Association	C.W. Nimmo ...	
Hughenden ...	Hughenden Pastoral and Agricultural Association	H. P. Blackall ...	7 and 8 May
Ingham ...	Herbert River Farmers' Association	...	
Ingham ...	Herbert River Pastoral and Agricultural Association (Agricultural Show)	P. J. Cochrane ...	Sept.
Ipswich ...	Ipswich and West Moreton Agricultural and Horticultural Society	P. W. Cameron ...	27 Sept.
Ipswich ...	Queensland Pastoral and Agricultural Society	Elias Harding ...	11 and 12 July
Kandanga (near Gympie)	Kandanga Farmers' Association	N. Rasmussen ...	
Kolan ...	Kolan Canegrowers and Farmers' Association	C. Marks	
Ladeside ...	Mungore Farmers' Association	I. M. Robinson ...	
Laidley ...	Lockyer Agricultural and Industrial Society (Ploughing Match, Laidley)	John Fielding ...	11 Oct.
Loganholme ...	Logan Farming and Industrial Association ...	F. W. Peek	
Longreach ...	Longreach Pastoral and Agricultural Society	J. P. Peterson ...	17 and 18 April
Lucinda Point	Victoria Farmers' Association	W. S. C. Warren ...	
Mackay ...	Agricultural, Pastoral, and Mining Association	F. Black	
Mackay ...	Pioneer River Farmers' Association	E. Swayne	28 and 29 June
Mackay ...	The Mackay and District Horticultural Society	Fred. Bourne ...	
Mapleton, *viâ* Nambour	Mapleton and Dulong Fruitgrowers and Farmers' Progress Association	W. J. Smith	
Maryborough	Maryborough Horticultural Society	H. A. Jones	
Maryborough	The Island Farmers' Progress Association ...	C. A. Schmidt ...	
Maryborough	Wide Bay and Burnett Pastoral and Agricultural Society	G. Willey	4, 5, and 6 July
Miallo ...	Miallo Progress Association	E. F. Welchman ...	
Miara, Yandaran	Avondale Farmers and Planters' Association	F. E. Eggar	
Milbong ...	Milbong Farmers' Association	T. R. Garrick ...	
Mitchell ...	Mitchell and Maranoa Pastoral, Agricultural, and Vinegrowers' Association	H. J. Corbett ...	
Mosman River	Mosman River Farmers' Association	Geo. W. Muntz ...	
Mount Cotton	Mount Cotton and Tingalpa Division Fruitgrowers and Farmers' Association	F. N. Sharman ...	
Mount Mee ...	Mount Mee Farmers' Association	R. Thomas	
Mount Morgan	Mount Morgan Agricultural, Pastoral, and Poultry Society	Thos. W. Walker ...	
Nambour ...	The Rosemount Association	George Etheridge ...	
Nambour ...	The Nambour, Blackall Range, and Moreton Agricultural, Mining, and Pastoral Society	J. R. Isgar	
Nerang ...	South Queensland and Border Pastoral and Agricultural Society	W. J. Browne ...	5 Oct.
North Isis ...	North Isis Canegrowers' Association	W. J. Young ...	
North Pine ...	Moreton Agricultural, Horticultural, and Industrial Association	J. Duffield	
Palmwood* ...	Maroochie Pastoral, Agricultural, Horticultural, and Industrial Association	Ernest E. Dalton ...	
Pialba ...	Pialba Farmers' Association	J. B. Stephens ...	
Pinbarren ...	Pinbarren Agricultural and Progress Association	H. Armitage, senr. ...	
Port Douglas	Pastoral, Agricultural, and Mining Association	W. H. Dorrat ...	2 Aug.
Razorback ...	The Razorback Fruitgrowers' Association ...	Robert Tinning ...	
Rockhampton	Central Queensland Farmers and Selectors' Association	T. Whitely, Coowonga	
Rockhampton	Central Queensland Stockowners' Association	R. R. Dawbarn ...	

* SHOW DAY.—Thursday previous to the Exhibition of the Queensland National, Agricultural, and Industrial Association, Brisbane.

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Rockhampton	Rockhampton Agricultural Society	R. R. Dawbarn ...	29 and 30 May
Roma ...	Western Pastoral and Agricultural Association of Queensland	Angus McPherson ...	
Roma ...	Yingerbay Farmers' Association	Alex. C. McIntyre ...	
Rosewood ...	Farmers' Club	P. H. Adams... ...	4 Oct.
Southport ...	Southport Horticultural Society	E. Fass	19 April
Springsure ...	Queensland Pastoral Society	G. R. Milliken ...	
Stanthorpe ...	Border Pastoral, Agricultural, and Mining Society	Geo. Simcocks ...	22 and 23 Feb.
Stanthorpe ...	Stanthorpe Horticultural and Viticultural Society	R. Hoggan	
Stanwell ...	The Stanwell Agricultural Society	A. Spanner	
St. George ...	Balonne Pastoral and Agricultural Association	T. M. Cummings ...	
Tinana ...	Tinana Fruitgrowers and Farmers' Association	Chas. Parke	
Toowoomba...	Darling Downs Horticultural Association ...	H. Hopkins	
Toowoomba...	Drayton and Toowoomba Agricultural and Horticultural Society	H. Symes	16 and 17 Jan., 1901
Toowoomba...	Royal Agricultural Society of Queensland ...	F. Burtt	31 July ; 1 and 2 Aug.
Townsville ...	Townsville Pastoral, Agricultural, and Industrial Association (formerly North Queensland Pastoral and Agricultural Association)	J. N. Parkes	6 and 7 June
Upper North Pine	Upper North Pine Farmers' Association ...	J. Skerman	
Wallumbilla	Wallumbilla Selectors' League	George Dalziel ..	
Warwick ...	Eastern Downs Horticultural and Agricultural Association	J. Selke	31 Jan. & 1 Feb.
Wellington Point	Wellington Point Agricultural, Horticultural, and Industrial Association	F. W. Wort	13 June
Woombye ...	Woombye Fruitgrowers' Association	P. S. Hungerford ...	
Woowoonga	Woowoonga Scrub Farmers' Association ...	G. T. Worth	
Zillmere ...	Zillmere Horticultural Society	C. M. F. Fischer ...	20 Jan.

GOVERNMENT AGRICULTURAL LABORATORY.

INSTRUCTIONS FOR THE COLLECTION OF SAMPLES, AND SCALE OF FEES.

GENERAL INSTRUCTIONS.

1. All analyses will be carried out in the order in which the samples are received at the Laboratory, with the exception of perishable substances like sugar-cane juice, milk, &c., which will be analysed immediately after arrival.

2. Should any person wish for an immediate analysis, the fee, charged in accordance with the scale of fees below, will be increased by 50 per cent.

3. The samples may be forwarded by parcel post or by rail, carriage paid, to the

Under Secretary for Agriculture, Brisbane,

or direct to the

Agricultural Chemist, Chemical Laboratory, Agricultural College, Gatton.

In all cases a letter, giving full instructions as to the information required, and enclosing the prescribed fee, must be sent at the same time.

4. Analyses will only be carried out if these instructions are adhered to, and if the samples are taken in accordance with further instructions issued below.

SCALE OF FEES.

	£	s.	d.
Soil—Partial chemical analysis, estimation of humus, nitrogen, lime, and total matter, insoluble in HCl	2	0	
Or estimation of lime, potash, phosphoric acid, nitrogen ...	2	2	0
Soil and subsoil—Partial analyses of the two samples according to either the one or the other of above eight schemes... ..	3	3	0

SCALE OF FEES—*continued.*

	£	s.	d.
Soil—Complete chemical analysis, giving moisture, humus, nitrogen, and all the mineral constituents soluble in hydrochloric acid ...	3	3	0
Soil and subsoil—Complete chemical analysis ...	5	5	0
Soil—Complete chemical analysis, as above; mechanical analysis, separation into gravel, sand, clay; and physical properties, as capacity for water, capillary and absorptive power, &c.	4	4	0
Soil and subsoil—Complete chemical analysis, as above; mechanical analysis, separation into gravel, sand, clay; and physical properties, as capacity for water, capillary and absorptive power, &c. ...	7	7	0
Water—Partial analysis, giving total solids, loss on ignition, chlorine, ammonia, and albuminoid ammonia ...	2	2	0
Water—Complete analysis (without bacteriological examination)...	3	3	0
Manures—As bone ash, bonemeal, superphosphates, Thomas slag, kainite, ammonia salts, meatworks refuse, &c.			
Complete analysis, giving moisture, ash, sand, organic matter, phosphoric acid (soluble and insoluble), nitrogen, lime, potash ...	2	2	0
Determination only of—			
Moisture ...	0	5	0
Sand ...	0	5	0
Nitrogen ...	0	7	
Potash ...	0	8	6
Total phosphoric acid ...	0	15	0
Phosphoric acid (citrate soluble) ...	0	15	0
Phosphoric acid (water soluble) ...	0	10	0
Food stuffs—Complete analysis, giving moisture, albuminoids, oil or fat, carbohydrates, ash, raw and digestible fibre ...	2	2	0
Estimation only of—			
Moisture ...	0	5	0
Albuminoids ...	0	10	0
Oil or fat ...	0	7	6
Ash ...	0	5	0
Total fibre ...	0	7	6
Digestible fibre ...	0	7	6
Sugar-cane, sugar-beet, megass—Analysis of ...	1	1	0
If more than one sample, every additional sample ...	0	10	6
Sugar-cane juice—Estimation of cane-sugar, fruit-sugar, total solids, water, quotient of purity, % Brix or Beaume ...	0	15	0
If more than one sample, every additional sample ...	0	7	6
Sugars, massecuites, molasses, jellies—Analysis of ...	1	1	0
If more than one sample, every additional sample ...	0	15	0
Milk, butter, cheese—Complete commercial analysis...	1	1	0
Tanning materials—Assay of tannin ...	1	0	0
Soaps—Commercial analysis ...	1	10	0
Limestone, cement, clay, marls, &c. ...	3	0	0

The fee for any other analytical work not mentioned may be learned on application.

INSTRUCTIONS FOR TAKING AND COLLECTING OF SAMPLES.

SOILS AND SUBSOILS.

In order to obtain a fair average sample of the soil from a block of land, as nearly as possible equal quantities of soil are collected from various parts of the field.

A rough sketch of the field, paddock, or block of land from which the samples were taken should accompany the samples. The spots where the samples were taken are marked on this plan and are numbered. This sketch plan should also indicate position of roads, creeks, gullies, ridges, general fall, and aspect of the land, &c.

Should the soil in various parts of the block show a very marked difference, it will be necessary to divide the block into two, rarely in more, parts. Should the different soil occur only in a small patch, this sample may be left out.

Not less than three samples should be taken in each section. A greater number is to be preferred, as a better average will be obtained.

At the places chosen for the taking of the samples the surface is slightly scraped with a sharp tool, to remove any surface vegetation which has not as yet become part of the soil.

Vertical holes from 10 to 18 inches square are dug in the ground to a depth of 2 feet 6 inches to 3 feet.

The holes are dug out like post-holes; an earth-auger facilitates the operation considerably, and the holes may be trimmed with the spade afterwards.

Careful note of the appearance of the freshly cut soil and subsoil should be taken. The depth of the real soil, which in most cases is easily distinguished, is also measured and noted for each hole. Note how deep the roots of the surface vegetation reach into the soil. If the soil changes gradually into the subsoil, as is the case in some places where the soil is of very great depth, this line of division is guessed approximately, or it is best to take the soil uniformly to a depth of 12 inches.

With a spade a slice of soil is now cut off and put on to a clean bag. The same is done with the subsoil, and the slice is taken from where the soil ends (or 12 inches) to the bottom of the hole, and this subsoil placed on another bag. Stones over the size of a pea may be picked out, the rough quantity of such stones estimated, and a few enclosed with the samples. Fine roots must not be taken out from the soil samples. The same operation is repeated at the other places chosen. Take careful note and description of soils in each hole, as numbered and marked on plan given. The samples of soil collected on the one bag are thoroughly mixed by breaking up any large clods, and about 10 lb. of the mixture put into a clean canvas bag, which is securely tied up and labelled. The same is done with the samples of subsoil collected on the other bag.

All the samples collected are afterwards placed in a wooden box.

It is important to use clean bags and clean boxes, and also that the samples should not be left in the neighbourhood of stables or manure heaps.

A short description of the land must accompany the samples and the sketch plan. In the case of cultivated land, state how long the land has been under cultivation, what crops were chiefly grown, result of such crops, was any manure applied, when, and what sort, and in what quantities per acre. In the case of virgin soil, state if the land was heavily timbered or not, ringbarked, if scrub or forest land, what sort of timber was chiefly growing on the land. In all cases a description of the neighbouring land, outcropping rocks, &c., are of great value. Also state if the land is naturally or artificially drained or not; describe the land as regards its position to hills, roads, creeks, ridges, &c. Only by adhering strictly to these instructions, and by giving minute details, can benefit be derived from the soil analyses.

WATER.

It is best to collect and forward samples of water for analysis in stoppered glass bottles, generally known as Winchester quarts.

The bottles have to be perfectly clean, and stoppers must fit well. Corks should be avoided, but if used must be new and well washed with the water before being used for closing the bottle.

When taking waters from taps, pumps, bores, the water must be allowed to run for a while before taking the sample. When taking the water out of a well, pond, or river, the bottle is completely immersed, but care must be taken not to disturb the mud or sediment at the bottom of the water. Before the sample is actually collected, the bottle is rinsed three times with the water, filling each time about one-third full. The bottle is then filled within about 1 inch from the top; the stopper is inserted and securely tied down with a clean piece of linen or calico.

The stopper must not be fastened or luted with sealing-wax, paste, plaster of paris, &c.

MANURES.

When taking samples of artificial manures from bags, the samples must be taken from different bags and at different places of the bag and not only from the top; or the contents are emptied on a heap and mixed up well and the sample then taken. About 1 to 2 lb. put into a clean bag should be forwarded for analysis.

FOOD STUFFS, ETC.

It is always important to obtain good average samples, and this can only be done by great care in taking the samples from different places, mixing well, and taking a small part of the mixture. This method would apply to any dry foodstuff—as grains of any kind, peas, beans, chaff, pollard, meal, &c. For the analysis of green foods—as green hay, sorghum, silage—it is best to make a mixture of the sample by passing it through a chaffcutter, and by taking an accurately weighed quantity—say 2 lb. This quantity is then dried in the sun, taking care that nothing is lost, and when dry put in a bag and forwarded for analysis, stating how much of the original green stuff the total amount of the dried material sent represents. The green samples may also be forwarded without drying in fruit-preserving jars.

To collect information about value of *green manures*, it is best to plot out exactly one square yard in the field covered with the plant, not picking out a position where the growth is very heavy or poor, but about a fair average. Four pegs are driven into the ground at the four corners, and string stretched between them; with a sharp spade all the plants are cut along the strings, so as to get really the growth of 1 square yard. The plants are all collected and accurately weighed, passed through a chaffcutter, and the sample for analysis taken as above described. In many cases the roots may be also pulled out, weighed separately, and a sample forwarded.

The samples must be accompanied by a description of the crop—when planted, how old when cut, if the land was manured or not, weight of crop per acre or per square yard, and weight of the sample forwarded when in its green state. In the case of green manures it is generally best to take the samples just after flowering, and immediately before ploughing in.

Samples of Sugar-cane, Sorghum, &c., are sent in bundles of six to ten whole stalks, wrapped up in sacks. Give nature, variety, and age of the crop.

Samples of Sugar-cane Juice, as, for instance, obtained at the rollers of sugar-mill, must be sent in clean bottles holding about a pint of juice. The juice may be preserved by the addition of a drop or two of formaline, or by sterilising the juice by heating the bottle containing the juice, before corking up, in a bucket or pan of warm water, gradually raising the heat until the juice in the bottle reaches a temperature of about 140 degrees Fahr.

Samples of Milk or Cream, for analysis, are best preserved by addition of a few drops of formaline solution; other preservatives should not be used.

Should a sample be taken with the view of checking the composition of an article to be sold or bought—for instance, the value of a maure sold and guaranteed to contain a certain amount of fertilising substances—an average sample must first be taken by the buyer in presence of the vendor. This sample is to be divided into three portions, each portion being securely fastened, marked, and sealed by both parties, each retaining a portion for further reference, and forwarding the third sample to be analysed.

Chief Secretary's Office,
Brisbane, 20th July, 1900.

THE following Proclamation, issued by His Excellency the Governor of Tasmania in Council, is published for general information.

ROBERT PHILP.

GOVERNMENT NOTICE.
No. 212.

Agricultural Department,
Hobart, 23rd June, 1900.

THE Governor in Council has been pleased to issue the following Proclamation, under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21).

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

"THE VEGETATION DISEASES ACT, 1898."

A PROCLAMATION.

WHEREAS it is expedient to permit the importation, introduction, or bringing into Tasmania of all citrous trees, cone-bearing trees, ferns, cacti, geraniums, bulbs, and all other plants (excepting fruit trees, cuttings, scions, buds and grafts of fruit trees, the importation of which is absolutely prohibited), subject to the performance of such conditions as are prescribed by Regulations made under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), bearing even

date herewith, or by any Regulations under the said Act which may from time to time be made by me in Council: Now, therefore, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the colony of Tasmania and its Dependencies, in Council, in pursuance of the provisions of the said Act, do, by this my Proclamation, permit the importation, introduction, or bringing into Tasmania of all citrous trees, cone-bearing trees, ferns, cacti, geraniums, bulbs, and all other plants (excepting fruit trees, cuttings, scions, buds, and grafts of fruit trees, the importation of which is absolutely prohibited), subject to the performance of such conditions as are prescribed by Regulations made under the said Act bearing even date herewith, or by any Regulations under the said Act which may from time to time be made by me, in Council: And I do hereby declare, that unless such conditions prescribed as aforesaid by Regulations made or to be made under the said Act, or any of them, are performed, I do hereby prohibit the importation, introduction, or bringing into Tasmania of the trees and plants so as aforesaid permitted by this my Proclamation to be imported, introduced or brought into Tasmania.

Given under my hand at Hobart, in Tasmania aforesaid, this twenty-second day of June, one thousand nine hundred.

GORMANSTON, Governor.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

Chief Secretary's Office,
Brisbane, 25th July, 1900.

THE following Regulations, made by His Excellency the Governor of Tasmania in Council, under "The Vegetation Diseases Act, 1898," are published for general information.

ROBERT PHILP.

GOVERNMENT NOTICE.
No. 213.

Agricultural Department,
Hobart, 22nd June, 1900.

THE Governor in Council has been pleased to make the following Regulations, under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21).

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

REGULATIONS.

1. Any nursery in which plants are grown for export to Tasmania shall hold a Certificate, signed by the Government Entomologist of the exporting country, that such nursery is free from all pests injurious to fruit trees; and such Certificate shall be forwarded to the Secretary for Agriculture in Tasmania.

2. Such plants as aforesaid shall be inspected by an Inspector of the Department of Agriculture of the said exporting country, duly appointed for that purpose, and, if found to be free from all pests injurious to fruit trees, a Certificate shall be issued to that effect by the said Inspector and forwarded to the Secretary for Agriculture in Tasmania.

3. All citrous trees, cone-bearing trees, ferns, cacti, geraniums, bulbs, or any plant (other than fruit trees, cuttings, scions, buds, and grafts of fruit trees), shall, before shipment to Tasmania, be fumigated with Hydrocyanic Acid Gas in a properly constructed fumigating chamber, for at least one hour, under the supervision of an Inspector duly appointed for that purpose, and a Certificate shall be issued by such Inspector, and forwarded to the Secretary for Agriculture in Tasmania, that such fumigation has been properly carried out.

4. The plants above mentioned shall be unpacked for examination by an Inspector at the port of entry, in a fumigating chamber, and the packing destroyed. If, in the opinion of the Government Entomologist of Tasmania, the plants above mentioned can safely be introduced into Tasmania, such plants shall be fumigated with Hydrocyanic Acid Gas in a properly constructed fumigating chamber, for not less than one hour before delivery, under the supervision of an Inspector duly appointed for that purpose in Tasmania, and a Certificate shall be issued by such Inspector, and forwarded to the Secretary for Agriculture for Tasmania, that such fumigation has been properly carried out.

5. The plants above mentioned shall be landed at the ports of Hobart and Launceston, and at no other port in Tasmania.

6. If any such plants are found to contain any pest the same shall be destroyed forthwith.

7. All costs and charges of inspection, fumigation, and destruction shall be borne by the consignee, provided that if such consignee be an agent only, all costs and charges as aforesaid shall be borne by the person for whom he is acting.

Chief Secretary's Office,
Brisbane, 4th September, 1900.

THE following Proclamations and Regulations, issued by His Excellency the Governor of Tasmania in Council, are published for general information.

JAMES R. DICKSON.

GOVERNMENT NOTICE.

No. 256.

Agricultural Department,
Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to issue the following Proclamation under "The Vegetation Diseases Act, 1898."

By His Excellency's Command,
GEO. COLLINS, Minister for Agriculture.

"THE VEGETATION DISEASES ACT, 1898."

A PROCLAMATION.

WHEREAS I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the Colony of Tasmania and its Dependencies, in Council, did, by a Proclamation dated the twenty-second day of June, one thousand nine hundred, made in pursuance of Section Three of "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), absolutely prohibit the importation, introduction, and bringing into the Colony of Tasmania of any fruit trees, cuttings, scions, buds, and grafts of fruit trees: And whereas it is expedient that such Proclamation as aforesaid should be revoked, and that other provision should be made in lieu thereof: Now, therefore, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief as aforesaid, in Council, in pursuance of the power and authority in me vested by Section Three of the said Act, and of every other power me in this behalf enabling, do hereby revoke my said recited Proclamation: And I hereby absolutely prohibit the importation, introduction, and bringing into the said Colony of Tasmania of all fruit trees, cuttings, scions, buds, and grafts of fruit trees, and the barberry, linden, enonymus, grapevine, maple, acacias, rose, strawberry, raspberry, hawthorn, ash, gooseberry, currants, honeysuckle, lilac, privet, bignonia, elm, oak, birch, alder, chestnut, willow, and poplar, or cuttings, scions, buds, and grafts of any of the same.

Given under my hand, at Hobart, in Tasmania aforesaid, this third day of August, one thousand nine hundred.

GORMANSTON, Govr.

By His Excellency's Command,
GEO. COLLINS, Minister for Agriculture.

GOVERNMENT NOTICE.

No. 257.

Agricultural Department,
Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to issue the following Proclamation, under "The Vegetation Diseases Act, 1898."

By His Excellency's Command,
GEO. COLLINS, Minister for Agriculture.

"THE VEGETATION DISEASES ACT, 1898."

A PROCLAMATION.

WHEREAS I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the Colony of Tasmania and its Dependencies, in Council, did, by a Proclamation dated the twenty-second day of June, one thousand nine hundred, made in pursuance of the provisions of "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), permit the importation, introduction, or bringing into Tasmania of the trees and plants therein named, subject to the performance of such conditions as were prescribed by certain Regulations therein referred to: And whereas it is expedient that such Proclamation as aforesaid should be revoked, and that other provision should be made in lieu thereof: Now, therefore, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief as aforesaid, in Council, in pursuance of the provisions of the said Act, do, by this my Proclamation, permit the importation, introduction, or bringing into Tasmania of any plant or plants (other than fruit trees, cuttings, scions, buds, and grafts of fruit trees, and the barberry, linden, enonymus, grapevine, maple, acacias, rose, strawberry, raspberry, hawthorn, ash, gooseberry,

currants, honeysuckle, lilac, privet, bignonia, elm, oak, birch, alder, chestnut, willow, and poplar, or cuttings, scions, buds, and grafts of any of the same, the importation of which is absolutely prohibited), subject to the performance of such conditions as are prescribed, by Regulations made under the said Act bearing even date herewith, or by any Regulations under the said Act which may from time to time be made by me in Council: And I do hereby declare, that unless such conditions prescribed as aforesaid by Regulations made or to be made under the said Act, or any of them, are performed, I do hereby prohibit the importation, introduction, or bringing into Tasmania of any plant or plants so as aforesaid permitted by this my Proclamation to be imported, introduced, or brought into Tasmania.

Given under my hand, at Hobart, in Tasmania aforesaid, this third day of August, one thousand nine hundred.

GORMANSTON, Govr.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

GOVERNMENT NOTICE.

No. 258.

Agricultural Department,
Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to revoke the Regulations made under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), dated the twenty-second day of June, one thousand nine hundred, and to make the following Regulations under the said Act in lieu thereof.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

REGULATIONS.

1. The Regulations made by the Governor in Council under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), and published by Government Notice (No. 213), dated the twenty-second day of June, one thousand nine hundred, are hereby revoked, and replaced by the following Regulations:—

2. Any plant or plants (other than fruit trees, cuttings, scions, buds and grafts of fruit trees, and the barberry, linden, enonymus, grapevine, maple, acacias, rose, strawberry, raspberry, hawthorn, ash, gooseberry, currants, honeysuckle, lilac, privet, bignonia, elm, oak, birch, alder, chestnut, willow, and poplar, or cuttings, scions, buds, and grafts of any of the same, the importation of which is by Proclamation, dated the third day of August, one thousand nine hundred, absolutely prohibited) shall, if imported, introduced, or brought into Tasmania from any of the Australian Colonies or New Zealand, or from Europe, be unpacked for examination by an inspector duly appointed for that purpose, at the port of entry, in a properly constructed fumigating chamber, and the packing destroyed, and such plant or plants shall be fumigated with Hydrocyanic Acid Gas for not less than one hour before delivery, under the supervision of such inspector.

3. Such plants shall, if imported, introduced, or brought into Tasmania from any of the Australian Colonies or New Zealand, be accompanied with a copy of a certificate signed by the Government Entomologist of the exporting country that the nursery in which such plants are grown for export is free from San José Scale; but this Regulation No. 3 shall not be deemed to apply to bulbs.

4. Such plants, before shipment to Tasmania from any of the Australian Colonies or New Zealand, shall be fumigated with Hydrocyanic Acid Gas in a properly constructed fumigating chamber for at least one hour, under the supervision of an inspector duly appointed for that purpose, and a certificate shall be issued by such inspector and forwarded to the Secretary for Agriculture in Tasmania that such fumigation has been properly carried out; but this Regulation No. 4 shall not be deemed to apply to bulbs, or to the importation, introduction, or bringing into Tasmania of same.

5. Any such plants, imported, introduced, or brought into Tasmania from any place whatever, shall be landed at the Ports of Hobart or Launceston, and at no other port in Tasmania.

6. If any such plants, imported, introduced, or brought into Tasmania from any place whatever, are found to contain any pest injurious to fruit trees, such plants shall be destroyed forthwith.

7. All costs and charges of inspection, fumigation, and destruction shall be borne by the consignee: provided that if such consignee be an agent only, all costs and charges as aforesaid shall be borne by the person for whom he is acting, and all costs and charges of inspection and fumigation as aforesaid shall be paid before the delivery of any such plants.

GOVERNMENT NOTICE.

No. 259.

Agricultural Department,
Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to issue the following Proclamation under "The Diseased Animals Importation Prevention Act" (47 Vict. No. 2)

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

"THE DISEASED ANIMALS IMPORTATION PREVENTION ACT."

A PROCLAMATION.

WHEREAS His Excellency the Honourable Sir JOHN STOKELL DODDS, Knight Companion of the Most Distinguished Order of Saint Michael and Saint George, Chief Justice of the Colony of Tasmania, Administrator of the Government thereof, in Council, did, by a Proclamation under his hand, dated the 26th day of July, one thousand eight hundred and ninety-nine, absolutely prohibit, for a period of Twelve months, the importation into Tasmania of any horses, cattle, and hides from the Colony of Queensland: Now, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the Colony of Tasmania and its Dependencies, in Council, in pursuance of the power and authority in me vested by Section Three of the Diseased Animals Importation Prevention Act (47 Vict. No. 2), and of every other power me, in this behalf, enabling, do, by this my Proclamation, absolutely prohibit, for Twelve months as from the expiration of the said period, the importation into Tasmania of any horses, cattle, and hides from the said Colony of Queensland.

Given under my hand, at Hobart, in Tasmania aforesaid, this third day of August, one thousand nine hundred.

GORMANSTON, Govr.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

GOVERNMENT NOTICE.

No. 260.

Agricultural Department,
Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to issue the following Proclamation, under "The Contagious Diseases (Cattle) Act, 1861."

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

"THE CONTAGIOUS DISEASES (CATTLE) ACT, 1861."

A PROCLAMATION.

WHEREAS His Excellency Sir ROBERT GEORGE CROOKSHANK HAMILTON, Knight Commander of the Most Honourable Order of the Bath, Governor and Commander-in-Chief in and over the Colony of Tasmania and its Dependencies, did, by Proclamation given under his hand on the eighteenth day of August, one thousand eight hundred and eighty-eight, prohibit the importation into any part of Tasmania, except Hobart and Launceston, of all cattle imported from the colonies of Victoria, New South Wales, Queensland, South Australia, Western Australia, and New Zealand, subject to certain restrictions in such Proclamation set forth: And whereas it is expedient to annul the said Proclamation and to make other provision in lieu thereof: Now, therefore, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the colony of Tasmania and its Dependencies, in Council, by virtue of the powers conferred on me by "The Contagious Diseases (Cattle) Act, 1861," do hereby annul the hereinbefore-recited Proclamation made as aforesaid under the provisions of the said Act; and I do hereby permit the importation and landing to take place at Hobart and Launceston of all cattle for the purposes of slaughter only imported from the colonies of Victoria, New South Wales, Queensland, South Australia, Western Australia, and New Zealand, subject to the following restrictions:—

1. All such cattle imported into Hobart shall be landed at the cattle jetty, in the River Derwent, near the public slaughter-house for the city of Hobart, and shall be driven from such jetty along the fenced road leading from the said jetty between the Queen's Domain and the said river to the said slaughter-house.
2. All such cattle imported into Launceston shall be landed at the cattle jetty lately erected near the public slaughter-house situate at Inveresk, on the banks of the River Tamar, at a spot known as Home Reach, and shall be driven direct along the race connecting the said jetty with the slaughter-house yards.

   No such cattle shall be landed upon that part of the said jetty which connects with the race leading away from the said public slaughter-house in the direction of the barrier fence erected at a chain radius from the said slaughter-house and the said jetty.
3. The captain or person in command of every ship or other vessel having any such cattle on board to be landed in this Colony shall forthwith, after his arrival in the Colony, notify to the Government Inspector of Stock at Hobart or Launceston, as the case may be, that such ship or other vessel has such cattle on board to be landed in this Colony.
4. All such cattle, upon being landed from any such ship or vessel, shall be inspected by the Government Inspector of Stock at the slaughter-house for Hobart, or at Inveresk, as the case may be; and all such cattle which on such inspection appear to be infected with any contagious or infectious disease shall be immediately killed and disposed of as the said Inspector of Stock may direct.

Given under my hand, at Hobart, in Tasmania aforesaid, this third day of August, one thousand nine hundred.

GORMANSTON, Govr.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

Chief Secretary's Office,
Brisbane, 14th September, 1900.

THE following Proclamations, issued by His Excellency the Governor of New South Wales in Council, are published for general information.

JAMES R. DICKSON.

PROCLAMATION.

By His Excellency The Right Honourable WILLIAM, EARL BEAUCHAMP, Knight Commander of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief of the Colony of New South Wales and its Dependencies.

WHEREAS the Governor is empowered by section 9 of the "Vegetation Diseases Act, 1897," from time to time by Proclamation in the *Gazette*, to declare any disease affecting plants to be a disease within the meaning of the said Act: Now, therefore, I, WILLIAM, EARL BEAUCHAMP, the Governor aforesaid, with the advice of the Executive Council, do, by this my Proclamation, declare Potato Scab (*Oospora scabies*) to be a disease within the meaning of the said Act.

Given under my Hand and Seal, at Government House, Sydney, this tenth day of August, in the year of our Lord one thousand nine hundred, and in the sixty-fourth year of Her Majesty's reign.

By His Excellency's Command,

JOHN L. FEGAN.

GOD SAVE THE QUEEN!

PROCLAMATION.

By His Excellency The Right Honourable WILLIAM, EARL BEAUCHAMP, Knight Commander of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief of the Colony of New South Wales and its Dependencies.

WHEREAS the Governor is empowered by section 1 of the "Vegetation Diseases Act, 1897," to prohibit, by Proclamation in the *Gazette*, the introduction into this colony of any plant which is likely to introduce any disease or insect into the said Colony: Now, therefore, I, WILLIAM, EARL BEAUCHAMP, the Governor aforesaid, with the advice of the Executive Council, do, by this my Proclamation, prohibit the introduction into this Colony from any place outside the Colony of any plant affected by the disease known as Potato Scab (*Oospora scabies*).

Any plant introduced in contravention to the above Proclamation may be forthwith destroyed, or otherwise dealt with as the Minister may direct.

Given under my Hand and Seal, at Government House, Sydney, this tenth day of August, in the year of our Lord one thousand nine hundred, and in the sixty-fourth year of Her Majesty's reign.

By His Excellency's Command,

JOHN L. FEGAN.

GOD SAVE THE QUEEN!

By Authority: EDMUND GREGORY, Government Printer, William street, Brisbane.

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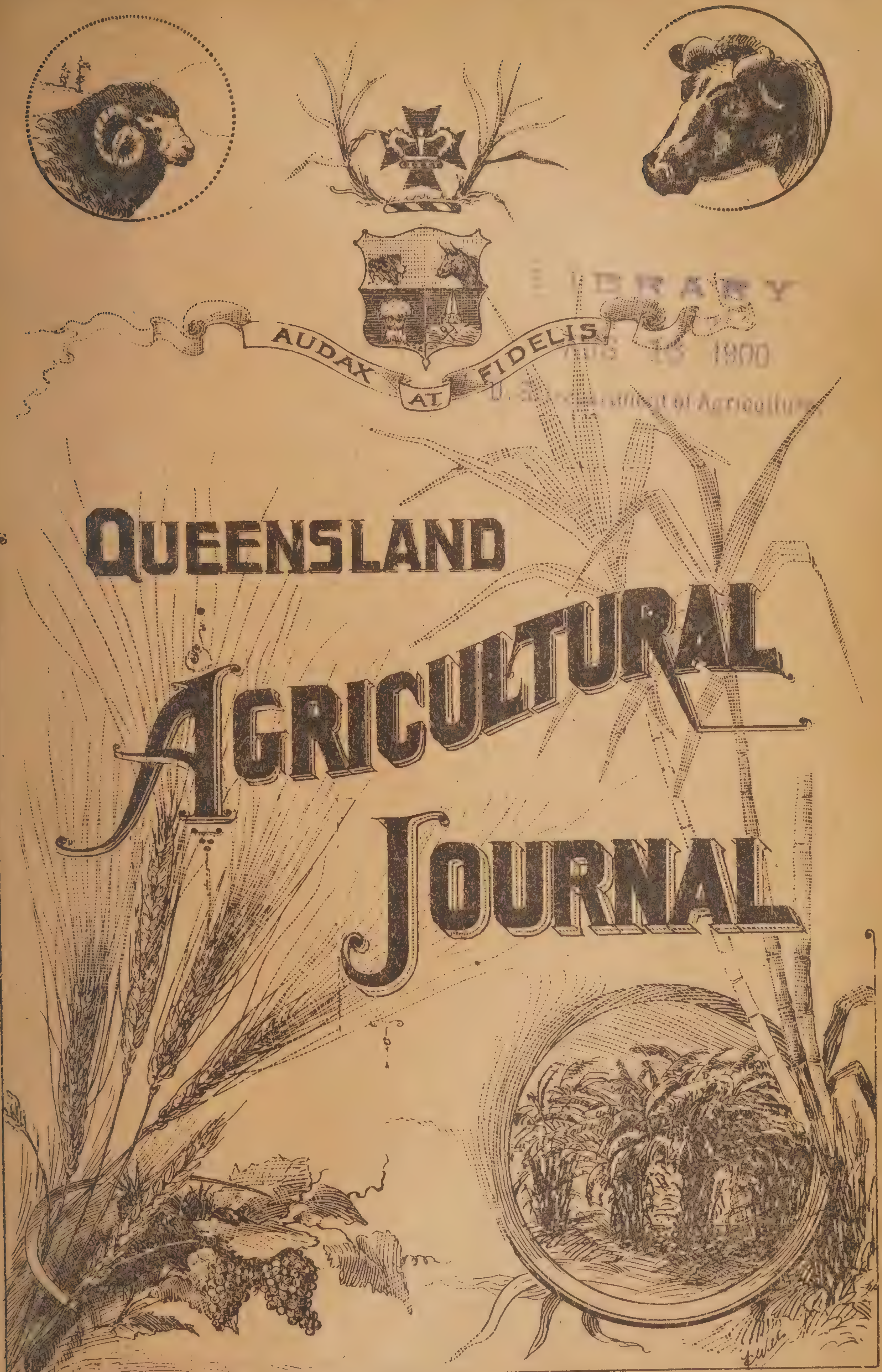

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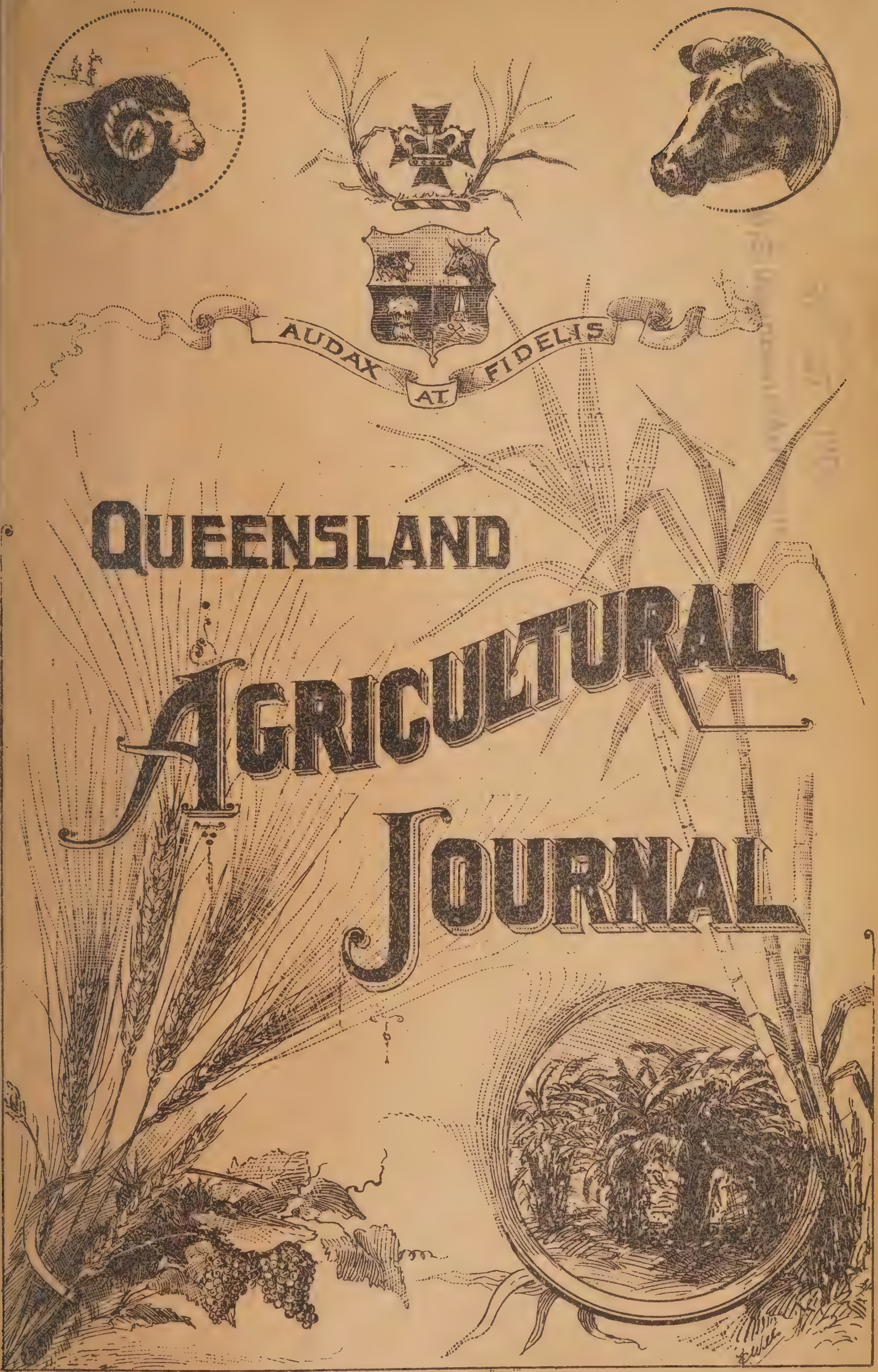

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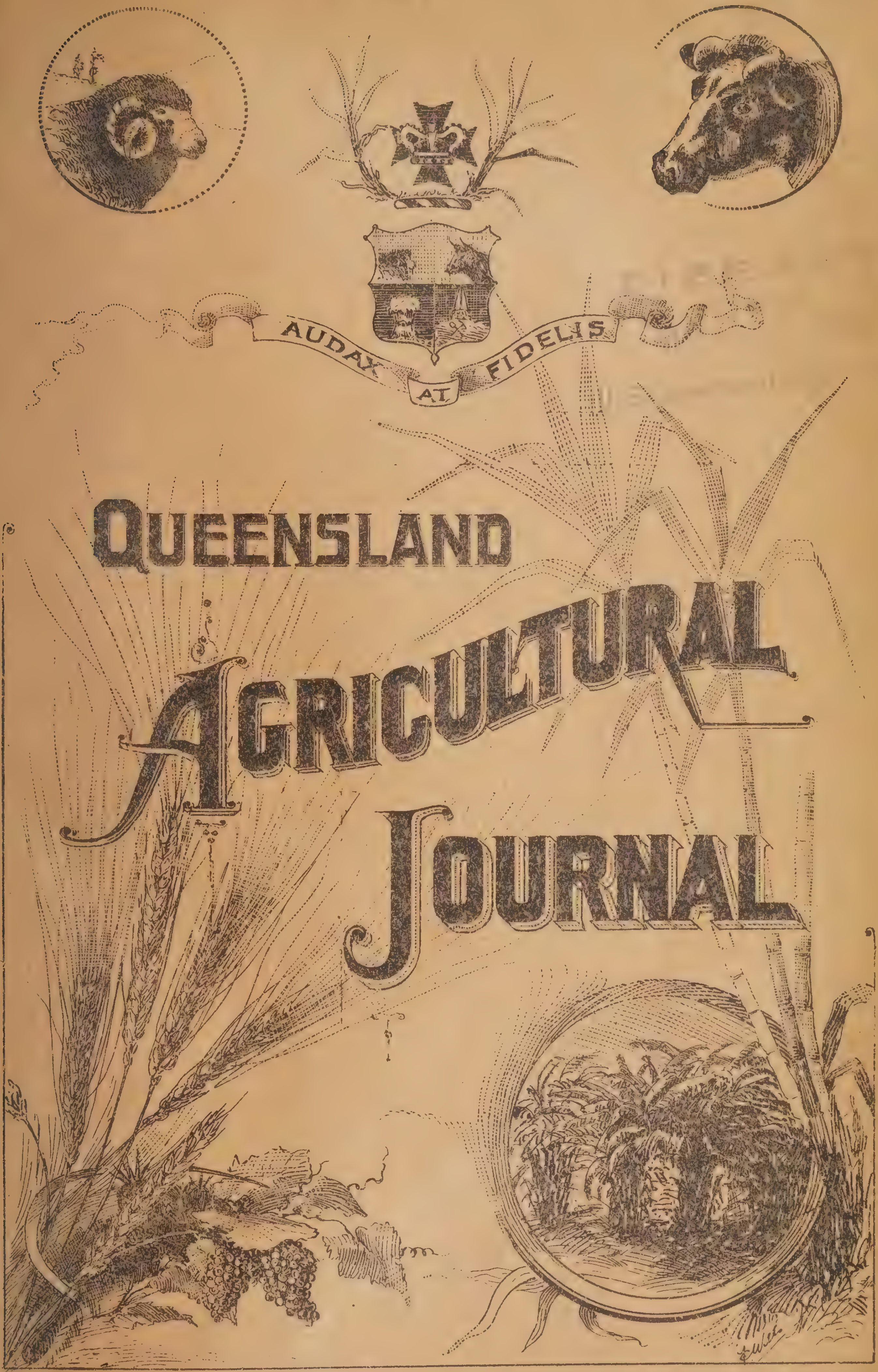

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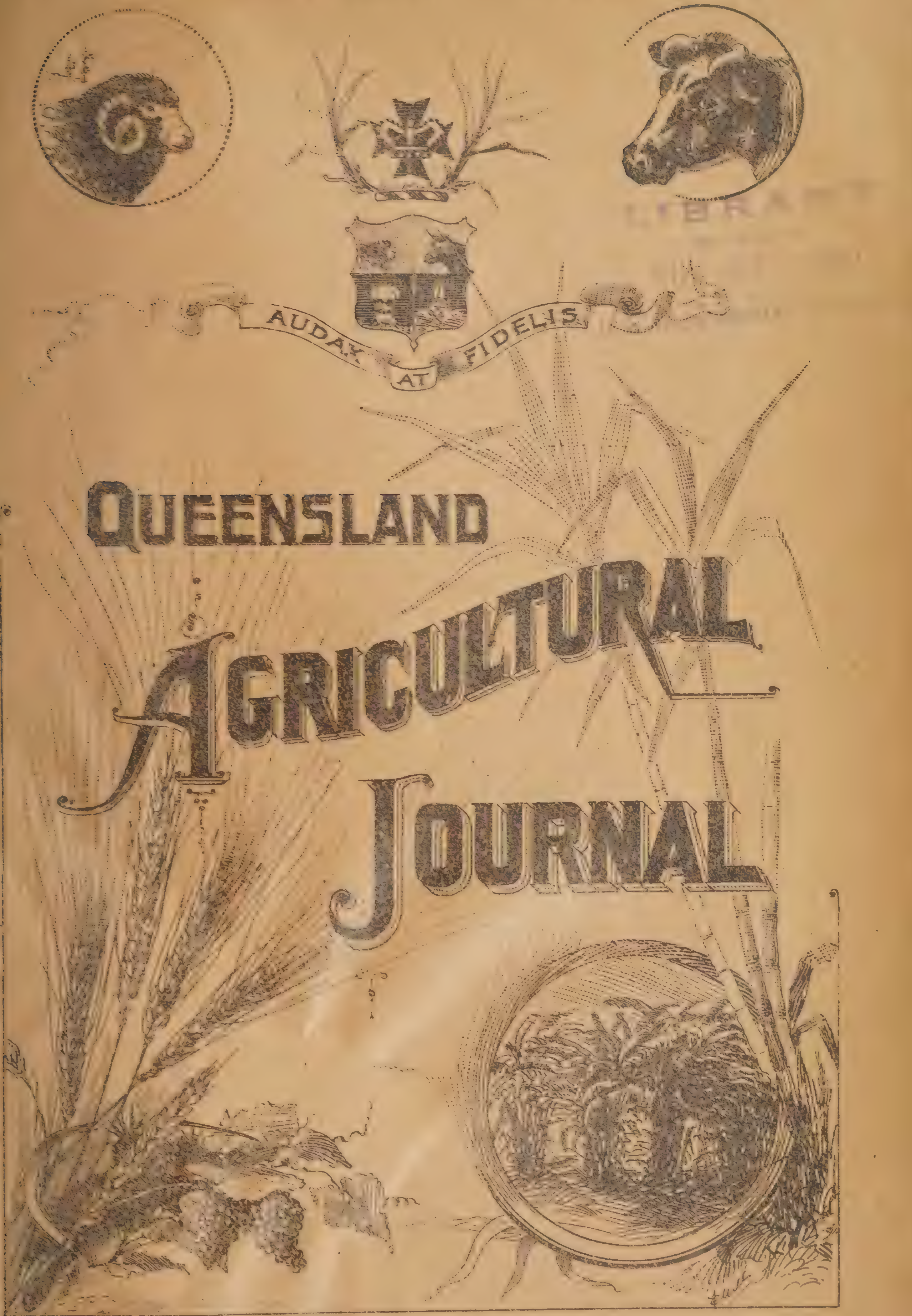

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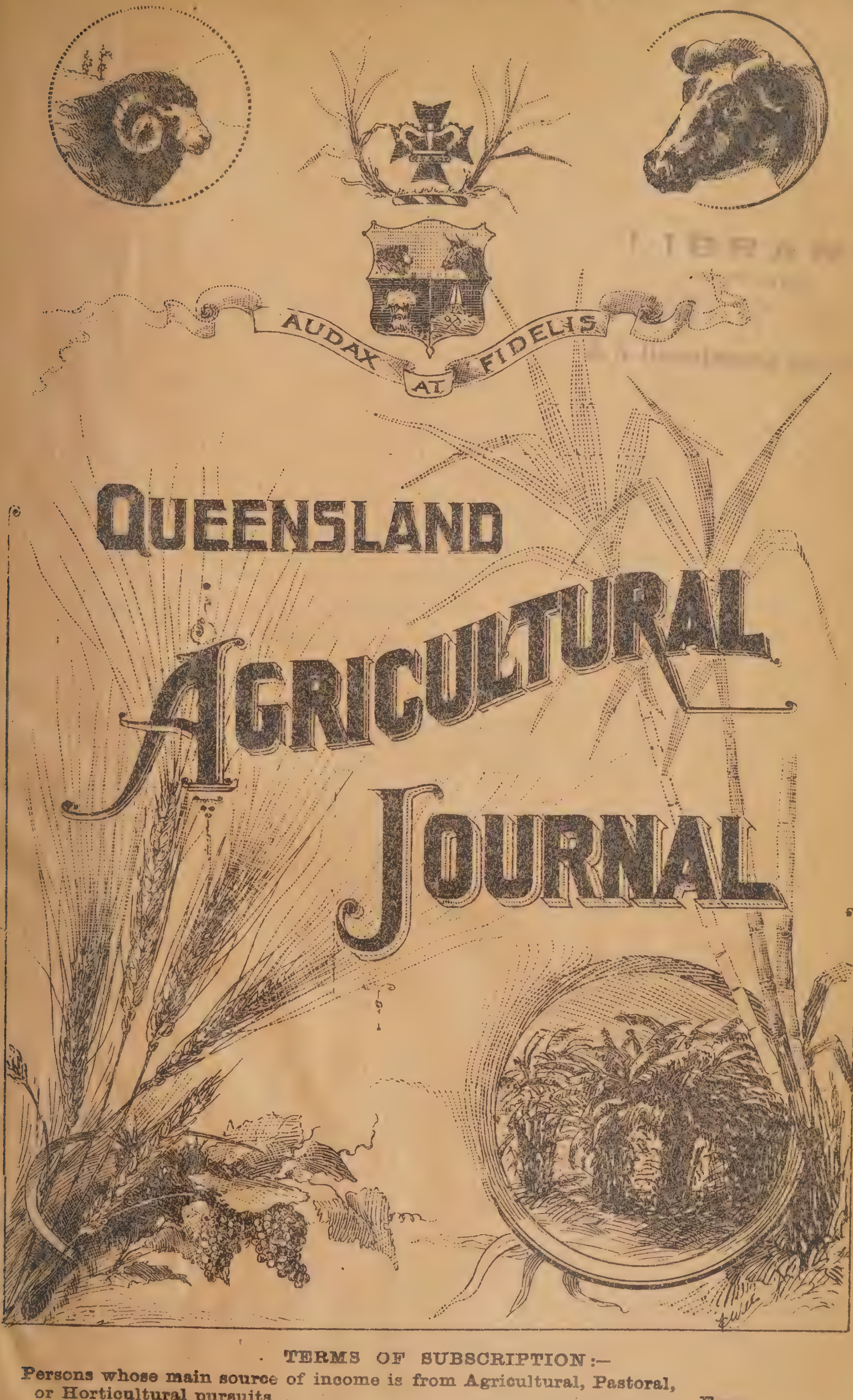

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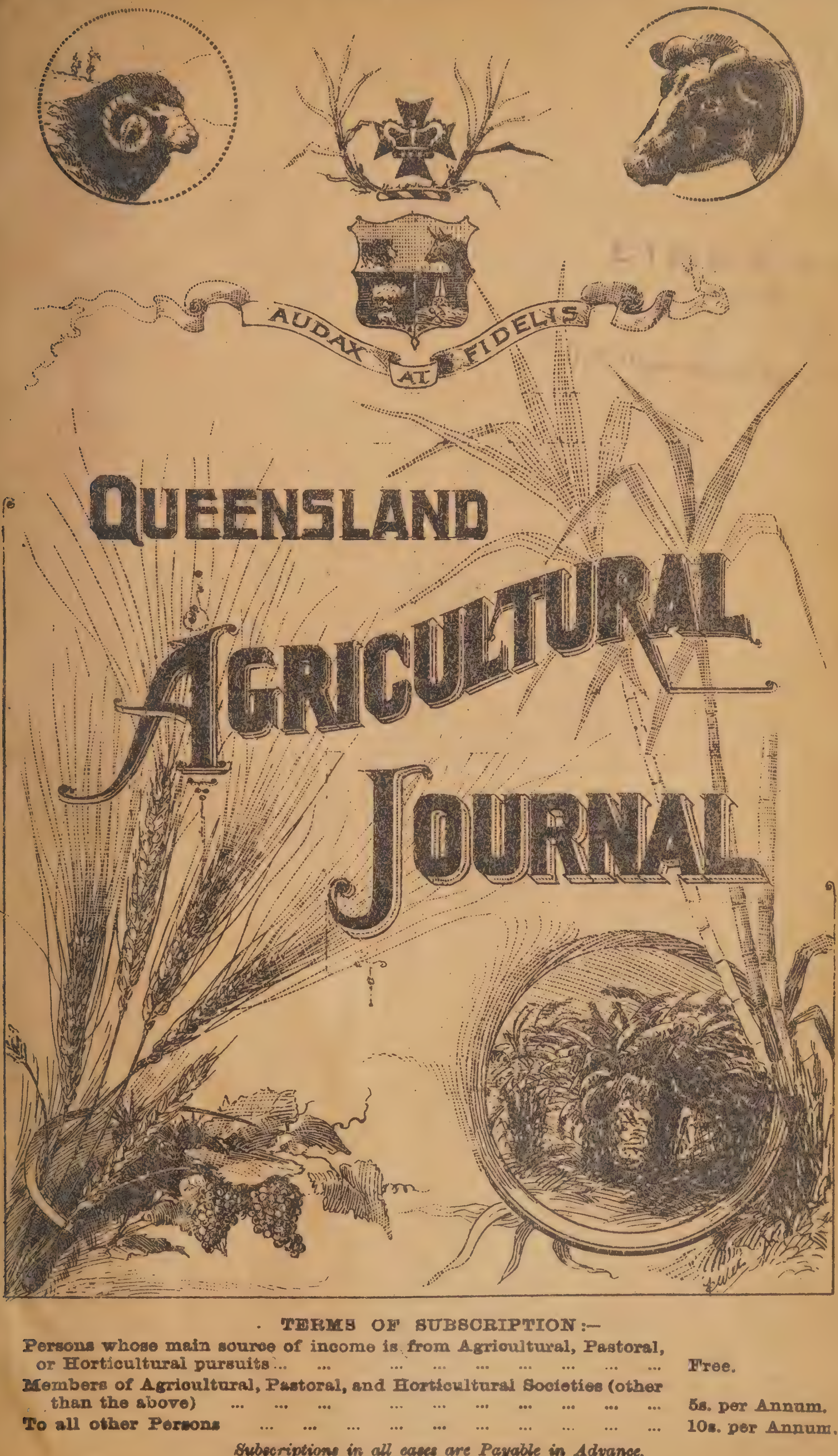

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